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POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

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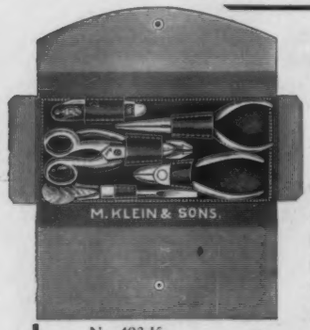

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VOLUME XXII. SAN FRANCISCO, MAY 15, 1909. NUMBER 20

A MODERN UNIVERSITY POWER PLANT.

BY GEO. H. TINKER.[1]

Owing to the addition of several new buildings and to meet the constantly growing demands of the University of Washington, the large State institution of learning at Seattle, Washington, it was found necessary to greatly increase the mechanical equipment, and for reasons of economy and convenience of operation, as well as for the advantages it would offer along educational lines, it was decided to build a complete new power plant for furnishing light, heat and power.

The power plant shown in Fig. 1 is located on the east side of the university campus, close to and overlooking Lake Washington, a large body of fresh water noted for its beautiful scenery.

The building is of pleasing design and of modern brick and concrete construction. It contains a complete equipment of modern mechanical devices for the economical generation of power, lighting, ventilating and heating and other requirements of a large educational establishment.

Fig. 1. Power Plant of the University of Washington.

The power house is divided into engine and boiler rooms, the latter being 46′ 6″ by 41′ 4″ in size and provided with a brick chimney 54″ diameter by 100′ high erected on a concrete base.

BOILER ROOM.

A spur track of the Northern Pacific Railroad leads to the power plant, and coal is received in a

[1] Chief Engineer Hallidie Machinery Company, Seattle, Washington.

concrete bin, as will be seen in Fig. 2. This storage bin has a capacity of 500 tons.

Coal is handled from the receiving bins, to bunkers, located above the stokers, by means of conveyor shown in Fig. 3, driven by motor located in the building.

There has been installed for present needs two Parker water tube boilers set in one battery, each

Fig. 2. Coal Storage Capacity 500 Tons.

Fig. 4. Elevated Engine for Operating Stokers.

boiler having 2672 square feet of heating surface and designed to operate at 160 pounds safe working pressure. Pressed brick is used in the settings, which are laid in cement mortar, and great care has been used to make a model installation throughout.

Each boiler has a single steam drum 54″ in diameter by 20′ long and ½″ thick and 128 mild steel tubes 4″ in diameter by 18′ long, with uptakes and drum nipples. Each boiler is equipped with an 8″

Fig. 3. Motor-Driven Coal-Conveyor.

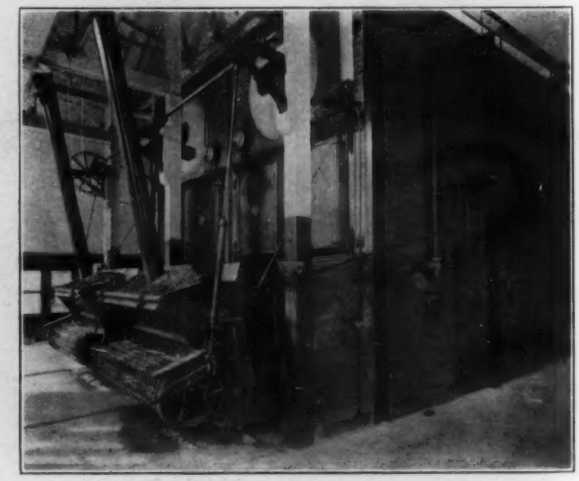

Fig. 5. Operation of Stokers.

delivery nozzle, two 3½″ Ashton No. 3 pop safety valves and complete boiler trimmings of latest pattern.

A grate area of 58½ square feet active surface in a Green chain grate stoker is provided in each boiler. A water back of extra heavy design is provided, with water supply and drain pipes. Almost perfect combustion is obtained in the regular operation of this plant, and it is only on very rare occasions, due to starting fire under boilers or something similar that any smoke at all is visible. The driving power for stokers is furnished by a small vertical Hallidie engine set on light steel platform overhead. This engine is belted to shaft over stokers which are eccentric driven (See Figs. 4 and 5).

At the rear of the boilers is located the breeching which carries the flue gases to the stack. The breeching is made amply large to accommodate an additional boiler unit to be installed in the future, a flue opening 24″ x 54″ blanked off, having been provided for future boiler. Each boiler connection is furnished with a damper operated from the front of boilers as shown in Fig. 5.

COAL AND ASH HANDLING.

As stated before, the coal is unloaded from bottom or side dump cars in receiving bin. It is then elevated to bunkers which can be seen in Fig. 6, which also shows the conveyor and the piping arrangement on top of boilers. The bunkers have a capacity of 30 tons and from each a delivery spout provided with cut-off gate serves the coal to each stoker. The coal conveyor is driven by a 5-horsepower Westinghouse

motor, with starting box located on boiler-room floor.

From the chain grates the ashes drop into a concrete tunnel under the boilers, from where they are "sluiced" out through the east wall of boiler house

Fig. 6. Coal Conveyor and Piping Arrangement on Top of Boilers.

and through a chute down the lake bank. Water is pumped by electric power from Lake Washington for the requirements of the University. But a surprisingly small quantity is required to "sluice" the ashes away, and as the water valves and nozzles are located in the boiler room, this makes an altogether convenient, clean and inexpensive method of getting rid of all ashes.

The boiler feed water is mainly secured from the returns of the heating system, augmented when necessary from the supply secured from Lake Washington. Return water is collected in a receiving tank located in tank room on east side of building (See Fig. 7). This tank is 36 inches in diameter by ten feet long, made of ¼ inch steel, mounted on concrete saddles and fitted with overflow, vent, inlet, suction, automatic pump control manhole, etc. The return pump shown in Fig. 7 is a 10 x 6 x 12 American outside packed plunger pump, made by the American Steam Pump Co., steam end lagged with 85 per cent magnesium blocks covered with Russian iron held on with polished brass bands and brass heads. Pump is fitted with Hills-McCanna mechanical lubricator with all attachments. The discharge from pump is connected to feed water inlet of heater, also cross connected to feed water piping direct to boilers.

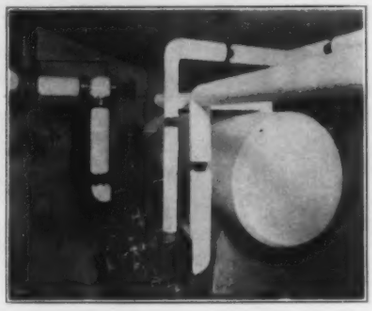

Fig. 7. Collecting Tank for Return Water.

A 750-horsepower Cochrane feed water heater and receiver, made by the Harrison Safety Boiler Works, is provided.

This heater is located in a corner of boiler room near boiler feed pumps shown in Fig. 4. An average temperature of 210 degrees is maintained in heater.

A 2½ inch pressure water system is provided in the power house for fire protection, with hose and nozzles on "Howard hose racks."

All low pressure piping, return piping, drips and blow off piping are placed in trenches, on separated rollers. Removable trench covers are ⅜ inch diamond plate and all piping arranged so as to allow for setting up or taking out of connecting bolts at any time.

All high pressure piping is extra heavy with standard "V" threads made into flanges, flush and peened out solid. All valves and fittings are extra heavy, with tongue and groove flanges and bolted with standard number and size of bolts for 250 pounds pressure. All gaskets are of copper.

All piping is supported by wrought steel strap hangers on rollers with brackets to allow of expansion in all directions. All oily drips are piped to a common 6-inch main leading to a water seal in receiving tank room, from where they are discharged into the sewer.

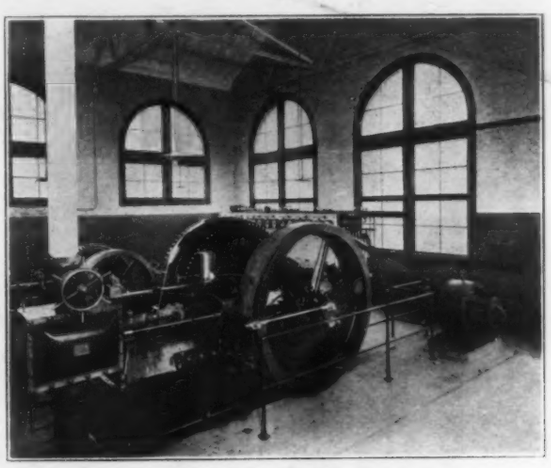

Fig. 8. Engine Room of Power Plant.

Two outside packed plunger boiler feed pumps of the American Steam Pump Co. make, size 12 x 6 x 12 inches, fitted with Hills-McCanna mechanical lubricating devices and Copes automatic pump governors are installed. Steam ends are jacketed in the same manner as that on return pump already described.

THE ENGINES.

The engine room presents a pleasing appearance. It is 32 feet 3 inches by 46 feet 6 inches in size, with lofty ceiling and plenty of light and ventilation. The floors are of concrete with smooth hard finish.

Two horizontal simple generating units are installed. These are Ridgway engines, made by the Ridgway Dynamo & Engine Co., direct connected to 100 kilowatt and 200 kilowatt generators, respectively. These engines (See Figs. 8 and 9) have cylinders 19 x 20 inches and 14 x 14 inches, and run at 200 and 300 revolutions per minute respectively.

Each engine is fitted with Ridgway improved tank oiling system, and Hills-McCanna lubricating devices, with nickle plated piping. Two complete sets of Thompson steam engine indicators with reducing motion, all in handsome hardwood cases are provided.

Engines are fitted with complete synchronizing mechanism operating on the "Begtrup" inertia governors for adjusting speed from the switchboard.

The engines receive their steam from the main steam header on the boiler room side of dividing wall, as shown in Fig 9. Cochrane steam seperators are placed in steam lines and connected with traps located in boiler room. The engines exhaust into an 18-inch exhaust main placed in a concrete trench and leading to the steam heating system for supplying heat to University buildings. Atmospheric exhaust, back pressure valve and 18-inch gate valve on heating main can be seen in Fig. 9.

On a handsome marble guage board in engine room are mounted the Schaeffer & Budenburg steam gauges, heating and receiving gauges and duplex gauge for checking the Davis reducing valve shown in Fig. 10.

in parallel at 2300 volts. The rotating parts are built upon a spider, which is solid and arranged to be pressed on engine shaft. The external frame is solid and movable parallel to the shaft to allow of access to the windings, as can be noted in Fig. 9. Armatures of these machines are of the slotted drum type and the core is built of laminated steel of high magnetic quality. Throughout the armature spider, core and windings, large and open ventilating ducts are provided, the design being such as to set up a forced circulation of air through these ventilating spaces. During the rigid test of the plant continuing through several days, frequently with 50 per cent overload, these generators, as also the engines, ran remarkably cool.

The switchboard, consisting of seven panels, shown in Fig. 11, was also furnished the contractors by the Westinghouse Electric and Manufacturing Company. It is located in the engine room, and consists

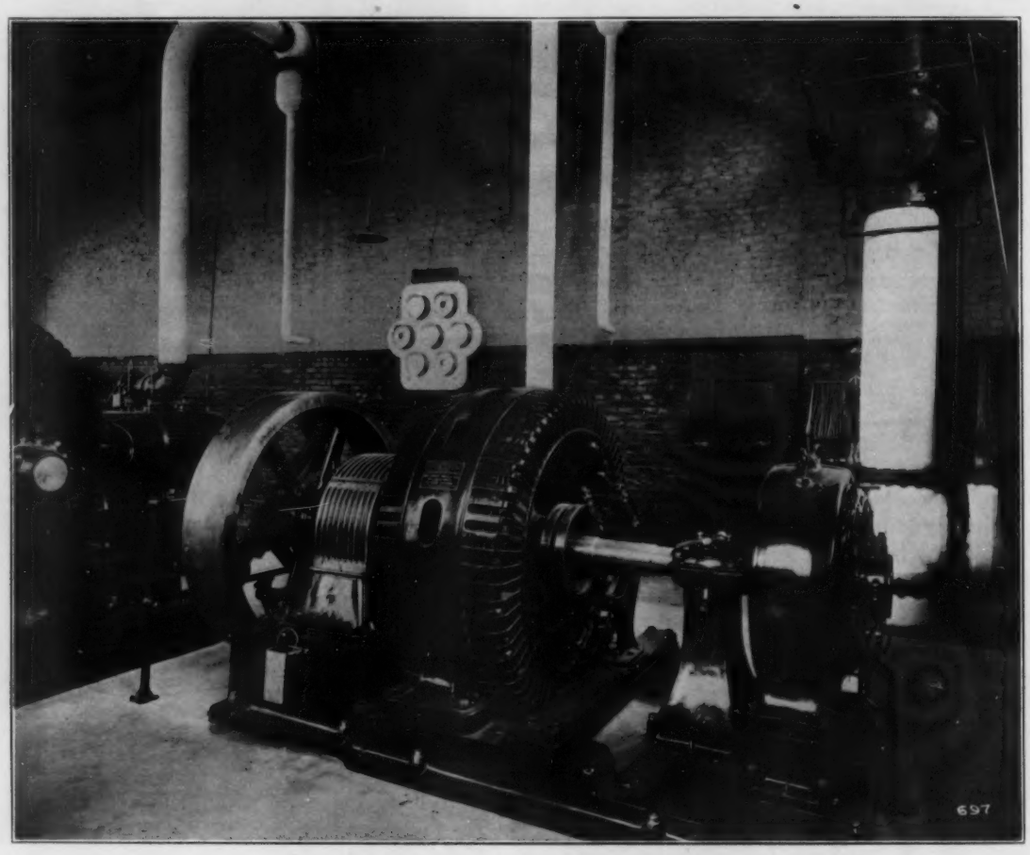

Fig. 9. Engine Room of Power Plant.

In Fig. 10 is also shown the 18-inch Cochrane oil separator to protect the heating system, also the live steam connection and the point of exit for the 18 inch exhaust main. This exhaust main is 1200 feet in length, has several branches 8 inch and 6 inch in size, to the various University buildings. All piping is insulated in redwood pipe, carried on rollers and provided at proper intervals with concrete manholes in which are placed expansion joints of special design anchored on concrete piers.

GENERATORS AND SWITCHBOARDS.

The generators are of the Westinghouse Electric & Manufacturing Company's alternating current rotating field engine type, 3-phase, 60 cycle and operate

of seven panels all of which are 24 inches wide by 96 inches high, except the two generator panels which are 32 inches wide. All oil switches and circuit breakers are mounted separately back of the board, the operating handles only being mounted on the panels, connections being made by bell cranks and connecting rods.

The switchboard is arranged for the control of two 125 volt exciters, one 100 kilowatt and one 200 kilowatt generators previously described, seven single phase lighting feeder circuits and three three-phase power feeder circuits. Mounted on brackets at left end of board are, two 3000 volt type "F" A. C. Voltmeters, one single phase synchroscope and one 3-phase power factor meter. Panel "A" on the left in Fig. 11,

controls the two exciters and the power house lighting circuits; panels "B" and "C", the generators, and on these are also mounted the switches for manipulating the synchronizing devices on engines; panels "D" and "E", control six lighting circuits; panel "F" one single phase lighting feeder and one 3-phase power

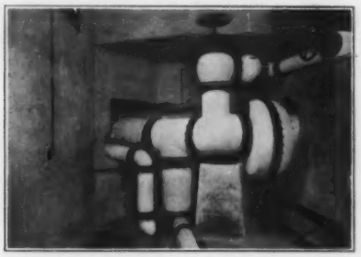

Fig. 10. Arrangement of Oil Separator and Reducing Valve.

feeder, and panel "G," which controls two 3-phase power circuits. All panels are provided with the necessary bus bars, wiring and inter-connections between instruments, switches, etc., and all switches provided with suitable terminals. All alternating current instruments for the 2200 volt circuit are provided with series transformers and all shunt instruments, such as voltmeters, synchroscope and power factor meters are provided with shunt transformers.

All wiring for generators, exciters, switchboards, etc., are placed in trenches with removable steel covers.

Under this contract was installed all of the circuits in underground ducts leading to the various University buildings. Lead covered cable was used and the whole installed in a most thorough and up-to-date manner and subjected to a severe test. The contractor also furnished and installed three 75 kilowatt oil cooled subway transformers with water tight cases. These were installed in concrete manholes.

There was also furnished under this contract one 8 inch and 13 inch by 12 inch Ridgway cross compound

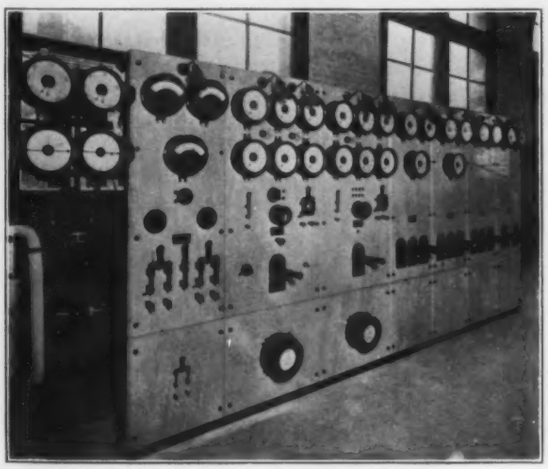

Fig. 11. Main Switchboard.

steam engine for experimental work in the new Mechanical Laboratory of the University.

All piping, fittings and valves used in this installation were furnished by the Crane Company of Chicago, Ill. All pipe covering was furnished by the H. W. Johns-Manville Co.

The entire power plant equipment, including heating and return mains, electric circuits, etc., was installed under one contract by the Hallidie Machinery Company of Seattle and Spokane, Washington,

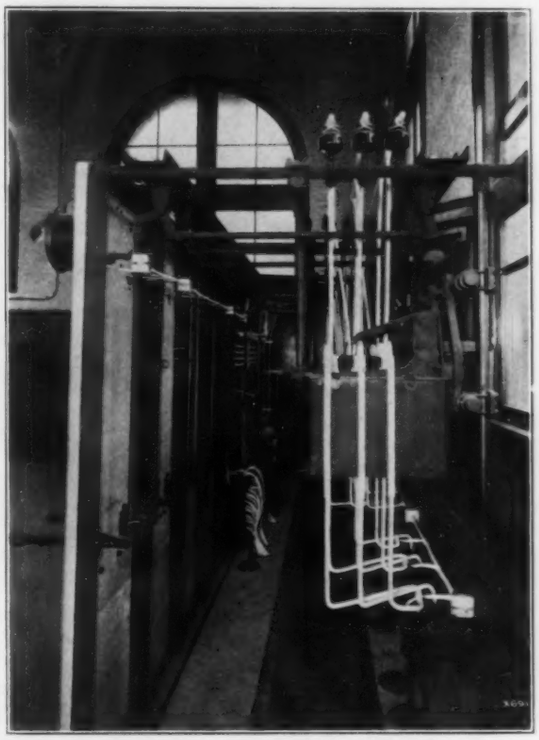

Fig. 12. Back of Main Switchboard.

under the personal supervision of Mr. H. L. Weber, the contractor's superintendent of construction. Howard and Galloway of San Francisco, were the supervising architects.

MECHANICAL AND ELECTRICAL LABORATORIES.

The foregoing mechanical and electrical apparatus supplements the following equipment of the mechanical and electrical laboratories and furnishes an object lesson to students in these branches of engineering of a thoroughly modern type of installation. The appropriation made by the Washington State Legislature provided for the construction of several other permanent buildings besides the power house to be used by the Alaska-Yukon-Pacific Exposition and to subsequently revert to the University of Washington. One of these buildings, Machinery Hall, will be occupied by the Engineering College and in addition to class rooms, drafting rooms and offices, will contain the testing laboratories of the department of mechanical engineering, and the laboratories of the department of electrical engineering.

The mechanical laboratory will contain a McEwen cross compound engine, a McEwen single cylinder engine, a Murray Corliss engine, a Ball engine, a Foos gas engine and a De Laval steam turbine. Besides these principal machines, the equipment consists of condensers, gauges, indicators, gas apparatus, barometers, thermometers, pyrometers, steam calorimeters,

fuel calorimeters, speed indicators, brakes, air compressor, air brake outfit, and such devices as may be necessary for testing and calibrating the apparatus used.

The electrical laboratory is equipped with generators and motors for both direct and alternating current.

In the D. C. section are located machines of the Westinghouse, General Electric, Bullock and Western Electric manufacture. Lamp banks, switch board, rheostats, storage batteries and other necessary apparatus are provided.

In the A. C. section are located dynamos of commercial types; a two-phase and a three-phase Fort Wayne generator; three-phase Westinghouse rotary converter; Wagner, General Electric and Bullock, single phase and three-phase induction motors and a three-phase Fort Wayne synchronous motor; transformers, lamp banks, switchboards and numerous meters. The electric equipment of the power house formerly occupied, will be added to these laboratories. Near the engineering building and the new power house will be located the shops of the mechanical engineering department, which will include departments in woodworking, machine shop and foundry practice. The foundry portion of this building will be equipped with a Whiting cupola, a Steele-Harvey brass furnace, crane, core ovens, mill, rattler, shaker, riddles, core machines and molding machines, and other accessories. One wing of this building will contain the forge shop, which will be fitted with 20 Buffalo down draft forges, a power hammer and a tempering furnace.

The entire equipment of the pattern shop and machine shop will be moved to different portions of this building.

DISTILLING TURPENTINE BY ELECTRICITY.

The attention of Consul-General George N. West has been called to a small plant in operation in Vancouver in which experiments have been carried on for several years with the view of obtaining turpentine from the resinous woods of British Columbia by an electrical process of distillation. He reviews the progress made:

The operations thus far have been carried on in a small way, only about two cords of wood or mill refuse having been treated daily. It is claimed, however, that the results have been eminently satisfactory. The turpentine, after tests by chemists and painters, who have used the product both for inside and outside work, pronounce it to be equal if not superior to the turpentine distilled from the long-leaf pine of the South. From one cord of the resinous wood treated it is claimed that the tar, oil, rosin, pitch, and charcoal (the by-products), more than pay the cost of the distillation of the turpentine, thereby making this process a valuable one.

It is claimed that from one cord of pitchy wood costing $5 there can be extracted chemically pure turpentine, tar oil, rosin, charcoal, and pitch to the aggregate value of $24.70, the present market value of these commodities, at an expense of $12, giving returns of $12.70 per cord. That this statement is not erroneous is vouched for by persons who have the most thorough knowledge of the process and cost of manufacture, they claiming that the small plant now in operation is producing the products at the price per cord stated.

The amounts of by-products said to be obtained from one cord of wood (amount of turpentine secured not being stated) are as follows: Rosin, 60 pounds; tar oil, 20 gallons; charcoal, 1,300 pounds. The oil is used for wood preservative, and is also manufactured into shingle stain. The charcoal, having been coked and cooled in a can out of contact with the air, is very perfect and valuable for making powder.

The resinous woods necessary for use in this plant are accessible in large quantities at cheap rates, not only from the many mills in Vancouver and near vicinity, but also from the standing timber that is not suitable for lumber, and can readily be procured. The plant has recently been increased to treat 40 cords of wood per day.

CURRENT COMMENT

Wireless communication was established between New York and Chicago on May 3, 1909.

Mr. Roosevelt will be about the first man to put the efficacy of a rifle fitted with electrically lighted sights for night shooting to a test, with a weapon especially given him by the United States war department for that purpose. The sights are the invention of a Chicago man.

A 12,000-candlepower lamp is another wonder. Recently an experiment was made with the "Sylverlyte" lamp, the light of which is guaranteed to penetrate the murkiest brand of fog. An electric bulb fits into the power lens of the lamp, which magnifies its 12-candlepower light up to 12,000 candlepower in a concentrated ray.

The Postal Telegraph & Telephone Employes' Association of Paris has thrown down the gage of battle to the government by forming itself into a union under the law of 1884. This places the association on the same footing with the workmen's union and gives them the right to strike. This movement on the part of the employes raises the important issue of whether the employes shall be the masters and not the servants of the state.

The first gas in Mexico will be furnished for the capital of that Republic by December 1st by the Mexican National Gas Company, a $2,500,000 Delaware corporation, formed by Los Angeles and San Francisco capitalists. The company is now buying generators, boilers and other equipments. The municipal government of Mexico City has granted the necessary concession for laying the mains in the streets and for all needed improvements. The officers and directors are: E. L. Doheny, president of the Mexican Petroleum Company, president; C. A. Canfield, first vice-president; R. H. Miner, Los Angeles, second vice-president; Norman Bridge, Los Angeles, secretary and treasurer; E. P. Ripley, president of the Santa Fe Railroad; E. C. Bradley, manager Pacific Telegraph and Telephone Company, San Francisco; W. L. Hardin, Los Angeles, and Harold Walker, Mexico City. For making the gas, crude oil from the fields of the Mexican Petroleum Company at Ebano and along the Gulf of Mexico will be used. At the start it will be delivered on the tank cars on the Mexican Central and the capacity will be 1,000,000 cubic feet, to be increased as rapidly as the demand justifies and it is expected to reach eight or nine million as a maximum.

CONSERVATION IN CALIFORNIA.

Representative of every county of California, the eleventh semi-annual meeting of the counties committee of the California Promotion Committee convened at Del Monte on May 8 to discuss the chosen theme, "Conservation in California." This was the first state meeting to consider this subject held in the United States since President Roosevelt called the conference of the governors of the states of the Union to take up the theme of conservation. A representative member of the National Conservation Commission was present at the meeting, as was also a member of the Inland Waterways Commission appointed by President Roosevelt, as well as other Federal and State officials, experts in various branches covered by the general subject of conservation, and the papers presented embodied the results of a thorough study of their subjects by those who have made a life work of them. Epitomizing the ideas in the papers and the ensuing discussion, the report of the committee on resolutions summed up, to an extent, indicated the line of effort that will be made by the Committee to carry to an effective consummation in California the movement for a better utilization of the State's natural resources and a wider appreciation of the importance of a heedful regard by the people of today of the heritage they are to leave to the people of tomorrow.

The meeting was held in the art gallery of the Hotel Del Monte, and was presided over by Andrea Sbarboro, chairman of the Counties Committee, which has met twice a year in different cities of California to discuss different matters of general State interest and importance, each session, as was the case of the Del Monte meeting, confining itself absolutely to the consideration of a single, broad subject.

William Sandholt, Jr., of Monterey, welcomed the delegates to Del Monte on behalf of the Monterey Chamber of Commerce, Pacific Grove Board of Trade, and the ladies' civic clubs of the two towns, which organizations had arranged for the reception and entertainment of the delegates.

Meeting in the Art Gallery of the Del Monte Hotel.

ADDRESS OF ANDREA SBARBORO.

Ladies and Gentlemen:

The eleventh semi-annual meeting of the Counties Committee of the California Promotion Committee will please come to order.

We have the pleasure to meet today in the historical city of Monterey on the border of the Pacific ocean, in the midst of most beautiful gardens, a spot of which there are few equal on the face of the globe.

The principal subject for discussion at this meeting is one of the greatest importance—"Conservation in California."

Nature has, indeed, been generous to California, giving us such bounteous and diversified resources, as no other part of the world is blessed with. It is our sacred duty to conserve these gifts in a most careful manner.

The great forests which have been handed down

to us from thousands of years past for our enjoyment and proper use, should be conserved and handed down to our posterity for their enjoyment and proper use for thousands of years to come.

Our water resources poured on our soil from Heaven and fed by our snow-capped mountains are abundant, but we should see to it that not a drop of this precious water is wasted, but all be put to proper use.

Our agriculture should be carefully fostered. California produces to perfection all the necessaries of life, required not alone for the use of its own people, but can supply its surplus to many people in our sister states and throughout the wide world.

We should be very grateful, indeed, to our present Congress for having by a prudent protective tariff conserved our diversified products from unfair competition; and we are also grateful to our recent Legislature for having passed by unanimous vote of both the Senate and Assembly resolutions recommending the encouragement and protection of our great viticultural industry and appropriating a permanent fund of $15,000 to the State University for its conservation.

Gentlemen, this is a matter of the greatest importance to our State, both morally and commercially. Morally, because we know that in the countries which are blessed with the soil and climate that produce grapes to perfection, all the inhabitants use the healthy juice of those grapes at their meals, and as has been recently proved by our Ambassadors and United States Consuls residing in those countries, as a result the people are free from the evil of intoxication.

Commercially, because as our State is one-third larger than the kingdom of Italy, which gives profitable employment in the viticultural industry to over five million inhabitants, so California, with the same soil and climate, can produce the same grapes, make the same fine wine and when our people will become accustomed to drink that healthy, non-intoxicating beverage in moderation at their meals, intoxication will be removed from our midst and California will also employ in the viticultural industry five million people, thus turning our sheep hills and valleys into beautiful vineyards, creating new towns and cities throughout the State and adding a revenue of two hundred million dollars per annum to our resources.

Our citrus fruits will likely be better protected by Congress and thus aid us in finding new markets, and both the Northern and Southern part of the State will increase its production of oranges and lemons, to be shipped to many parts of the world.

Our mines, which first brought California to the attention of the world, should also be carefully protected by regulating their proper management in such a manner that gambling and wildcat schemes will be prohibited. This will encourage capital to invest in legitimate mining enterprises and result in the proper development of our inexhaustible mineral resources.

The oil wells should also be carefully regulated so as to avoid waste and increase the output of this great California industry.

In conclusion, I will say that California is blessed with so many resources that when they will have become developed to their full capacity, with due regard to their conservation, this State will give profitable occupation and be inhabited by twenty millions of the most prosperous and happy people on the face of the globe.

Following the address of Mr. Sbarboro, the Chairman appointed the following Committees:

Committee on Credentials: Geo. B. Finnegan of Nevada county; F. N. Delanoy of Alameda county; C. A. Turner of Tulare county; T. A. Richmond of San Francisco county; Rudolph A. Wilson of San Benito county.

Committee on Resolutions: Judge Frank H. Short of Fresno county; C. A. Moody of Los Angeles county; George W. Pierce of Yolo county; George F. Roberts of Napa county; H. F. Stoll of Marin county.

If space would permit, it would be the pleasure of the "Journal" to reproduce in its entirety the many valuable papers read at this convention. Two of the papers, however, are of such general interest to the American people that we reprint them as read.

THE ECONOMIC VALUE OF IMPROVED RIVERS AND DEEPENED HARBORS.

BY JOHN A. FOX.

The complete development and utilization of our inland waterways for navigation, and the speedy and efficient improvement of our sea coast harbors are perhaps the most important of all matters that present themselves today for consideration at the hands of the American people. Before an assemblage of this character, therefore, where conservation is the theme, it is perhaps very proper that some thought be given to this subject—especially to that phase of the subject which pertains to the improvement of inland waterways.

The conservation of our water is without doubt the most imperative duty that confronts us; for in the present condition of waste, or non-utilization of natural resources, the waste of water is much more far reaching than the waste of any other natural gift. Each inch of rainfall wasted means so many millions of dollars lost in Agricultural wealth; the flow of every cubic foot of water to the sea unused means the loss of millions of dollars worth of heat, of light, of mechanical force; the unused channel of every mile of water course means an extravagance that in the aggregate costs the people of this nation many millions of dollars each year. In permitting our water to go to waste, therefore, we are losing the primal source of nearly our entire wealth.

By concerted effort as a people, as a nation, we may cause great arid and unproductive areas to yield agricultural products; we may harness the rivers and rapid flowing streams to run our workshops and haul our trains, and at the same time produce a great network of intercommunicating water routes upon which our products may be most economically transported.

It is with the transportation feature that I will deal particularly on this occasion, because that is the mission of the National River and Harbor Congress. There are at present some 45,000 miles of inland waterways traversing the United States, upon which commerce could be carried today at a great savings to the people if adequate improvements were made upon them, such as have been made upon the water-

ways of other countries. These embrace the possible navigable rivers of the Pacific coast, the 16,000 miles in the valley of the Mississippi, and about 17,000 miles of rivers from 100 to 300 miles in length penetrating the Atlantic and Gulf coasts. They are today of little or no service in transporting our freights because of the unstable and unreliable depths of water to be found in them, and, owing to conditions resulting from internal development and the advance of civilization, they are perhaps of less use today in transporting freights than they were in their natural state some 50 or 100 years ago. Prior to the settling of the plains, the clearing of the forests and the draining of the pools, silt and loosened earth that now fills the natural river beds was held by native turf; forests that no longer stand, held back and retained the waters, and vast areas now provided with modern drainage no longer feed out the even flow for a period of twelve months, but disgorge in great floods for two or three months and leave the channel dry or too shallow for navigation during the remainder of the year. All of this can and should be rectified by the national government, so that this vast natural system of water courses could again be utilized.

We are neglecting this important duty every day, and the condition of these rivers is becoming worse and worse, although many believe that the rivers and harbors of the nation have received ample funds at the hands of Congress. When you pause to consider that we are devoting only about $22,000,000 each year to this most important character of national development, while we spend $140,000,000 every year on pensions, and $110,000,000 every year on a navy, and $82,000,000 every year on an army, you, too, will conclude that this phase of our development is neglected.

Consider, moreover, what a magnificent investment this nation could make by improving these rivers for navigation. It would require an outlay of about $500,000,000 during the next ten years to construct the needed improvements on this vast system embracing the San Joaquin and the Sacramento; the Snake and the Columbia; the Missouri, the Ohio and the Mississippi; the Red and the Arkansas; the Intercostal canal and the Atlantic Deeper Waterway, and all of the other important rivers reaching nearly all parts of the country. Once improved, these waters would become capable of navigation and a vast tonnage that must now move by rail at a cost of $7.59 per ton per 1,000 miles, which was the average rate by rail last year, could be carried at a rate of $2.00 per ton per 1,000 miles, which was the highest rate on inland waterways. Now, the amount of freight carried by the railway systems last year was 236,038,000,000 tons carried one mile, so that if the waterways had been improved and had been able to carry but one-tenth of this bulk at a saving of $5.00 per ton per 1.000 miles it would have amounted to over $118,000,000, or more than 25 per cent on the entire cost. As water rates determine the rail rates, however, it would have even been more than this, and if the regulating influence that is now felt by the roads that compete with water traffic on the Great Lakes, the Ohio or the Mississippi river, can be taken as a basis, the reduction would have been $1.00 per 1,000 miles on all of the remaining freight that was carried by rail, or practically $200,000,000. It would appear then that $318,000,000 saved annually to the American people by the investment of $500,000,000 would be a very good investment. There is no doubt but what such a saving would follow these improvements for it has been demonstrated wherever we have made thorough and complete improvements to benefit navigation, for example on the Great Lakes, on the Monongahela river and along the Atlantic coast. Moreover, we have the example of the waterways of Germany, France, Belgium and the other European countries to give us some idea of what could be saved by encouraging transportation by water.

Then, too, deepening our harbors has paid for the investment many times over, and that is a work which must be extended until all of our seaports are capable of harboring vessels of a uniform draft of at least 30 feet.

A Short Stop at Pajaro.

It is estimated that all together we have as a nation expended but little over $587,000,000 in river and harbor improvements. On twelve important harbors on the Gulf and Atlantic coast we have expended but about $53,000,000, and yet the saving every year on freights that come in and go out of these harbors because of the present greater depth exceeds that entire amount many times over. In New York harbor alone there is an annual saving of nearly $82,000,000, because a 35-foot channel exists instead of the former 23-foot channel. The reduced price on the export of cotton and grain alone on account of deeper water in the Southern harbors nets the American people over $18,000,000 annually, because a 15,000-ton vessel can now replace the old 3,000-ton vessel, and charges 27 cents per 100 pounds less on cotton and 5 cents per 100 pounds less on grain than was the case before improvements were made.

Moreover, it is at least interesting to note the enormous impetus given to our commerce by these improvements, as is exemplified by a few of the Eastern and Gulf harbors. Boston harbor, deepened from 18 feet to 30 feet at a cost of $7,273,000 has increased her commerce from $66,600,000 in 1870, to $209,700,000 in 1907; New York harbor with improvements that cost only $2,146,000 has increased her commerce from $840,276,000 in 1886 to $1,163,110,000 in 1907; Norfolk's commerce has been increased by the improvement of Hampton Roads at a cost of $1,665,000 from $21,349,000 in 1890 to $597,950,000 in 1907; Mobile,

with $4,949,000 spent upon her harbor deepening it from 13 feet to 23 feet has seen her commerce grow from $3,479,000 in 1890 to $28,419,000 in 1907, and Galveston harbor, improved at a cost of $7,591,000 has shown an increase from $24,862,000 in 1890 to $244,337,000 in 1907. Nor have harbor improvements been less remunerative here on your Pacific coast, for, although in all of the harbor improvements made out here, from San Diego on the south to Bellingham on the north, only about $20,000,000 has been expended; yet so great has been the impetus given to commerce that it has increased in the aggregate from 4,662,000 tons in 1885 to 15,654,000 tons in 1907. At Oakland, California, and Portland, Oregon, the results have been most remarkable. At an expense to the national government of a little over $2,878,000, Oakland harbor entrance has been increased from five feet in 1874 to 25 feet in 1907, and as a result her commerce has expanded from 156,300 tons to 4,210,125 tons annually. In improving the entrance to the Columbia river and perfecting a channel to Portland, Oregon, about $7,286,000 has been spent, and the commerce has expanded with a growth of 4,351,000 tons in 1907 as compared with 1,637,000 tons in 1898. It has been the best investment of any $20,000,000 ever made by this nation, and more investments of this character must be made in the future if we, as a nation, are to reap the benefits to be derived from the digging of the Panama canal.

The time has come, gentlemen, when these river and harbor improvements must be carried on in a more extensive and comprehensive manner. There must be more businesslike methods pursued, larger sums appropriated and work must be done in a more continuous and less wasteful manner. Under the present system we undertake to build a breakwater estimated to cost $3,000,000, and $1,000,000 is appropriated to start the work. Half of this is used in getting ready the false work and maybe the next River and Harbor bill fails to pass Congress and by the time another bill can be passed carrying some more of the needed $3,000,000, the false work has been destroyed by toredos and must be built over again. We undertake to improve one of our rivers and contracts are let for certain locks and dams and a large amount of money is appropriated to begin the work. Congress fails to provide for this undertaking when the next River and Harbor bill is framed, and hundreds of thousands of dollars are lost in the ravages of floods and time. This must cease, and a continuous river and harbor policy must take its place, with money provided every year just as is provided for the army, the navy or the judiciary. We can only bring about such a change when the entire American people shall have been informed and made to express themselves regarding such matters. You here in California can help bring about such a change as well as the people in Illinois, or New York, or Louisiana, and with your great interest in controlling the San Joaquin and Sacramento rivers, and in having better provision made for deep water in your harbors, you should do all in your power to help agitate the question and promote such a change of policy as will insure the expenditure of not less than $50,000,000 each year by Congress until these worthy rivers are controlled and made useful for navigation and our splendid harbors are uniformly deepened for the traffic of the world.

THE CONSERVATION OF CALIFORNIA'S FORESTS.

BY F. E. OLMSTED.

In the matter of conserving its forest resources, California is vastly favored over many of the eastern states, for it has taken up this problem while there is still something to conserve. In the Lake region of the East, for example, the question is one of restoration, rather than conservation because, practically speaking, there are no forests left to conserve. Fire and ax have left the lands waste and barren, and in many cases the only way to secure a new forest is through artificial planting.

In California conditions are quite different, because here both of the great mountain ranges of the state are still fairly well covered with an excellent forest growth, and if we carefully protect and wisely use the resources now standing there is no reason why they should not be made of permanent value. Roughly speaking, the total stand of timber in California amounts to about 250 billion feet. Of this amount approximately one-half is owned by the national government and one-half by private and corporate interests. If conservatively used this stand should furnish a yield of over two billion feet annually for all time. Those forest lands owned by the national government are now fairly well protected and the policy of holding them as a source of permanent wealth is already established. The United States expends $400,000 each year for their protection and administration and employs over 400 men in this work. Up to the present time the financial returns have equaled about one-half the amount expended, but next year it is expected that the income will equal the expenditure. The leading principle which permeates the whole management of national forests is that trees should be kept growing on all lands which are of chief value for the production of trees, and that this should be brought about through wise use. The national government, for example, is selling large amounts of mature timber every day, but the forest is cut in such a way as to make sure of future crops on the logged off areas; in other words, the lands are protected and left productive after lumbering instead of being abandoned to fire and becoming waste and non-productive.

The question, then, of most immediate importance in California is how to bring about favorable conditions for practical conservation of forest resources on private and corporate timber lands. The consideration of this subject is peculiar in that the way in which the forests of California are handled has a marked influence on almost all the other great industries of the state. Any discussion of this subject must, therefore, be approached not from the standpoint of the timber owner, or manufacturer; not from the standpoint of the rancher or irrigationist; not from the standpoint of the developer of water power, or the miner, or the home-builder, or the city resident; but from the standpoint of all these interests combined. They are all intimately affected, because wood will always be most essential to all of them, and because forest lands can not be laid waste and made non-productive without causing serious injury to each. The

problem then must be considered from the standpoint of the common good, with an eye to what the future will demand.

There are several leading points in the question of forest conservation which some years ago were widely argued and discussed, but which at the present time may fairly be taken for granted. They are these:

It is worth while to expend money now in order to save from destruction what we already have.

Land of chief value for the production of trees should be kept covered with trees with the greatest number and the most valuable kind of trees the land will produce.

In many cases it is essential to keep trees growing on mountain lands not only for their market value as trees but also for their value in regulating the flow of water, so vital to the prosperity of the agricultural, waterpower and other interests.

In all cases where the land should be kept in trees, the forest when cut should be handled in such a way as to get the best possible new crop in the shortest time and at the least expense.

Conditions should be made as safe and as reasonable as possible for the holding and proper harvesting of the next crop.

How can all these things be brought about?

Let us not forget that they mean one thing to the national government, or the state, and quite another thing to the private owner. The State may well afford to expend money for protection and wait comparatively long periods before it derives comparatively small returns from the harvesting of future crops. But the private owner is naturally and usually necessarily influenced by the desire for the greatest possible immediate returns, and, under existing conditions, can not often afford to handle his property with a view to small returns after comparatively long waits. Under almost all systems of conservative management which provide for continuous crops of timber the rates of interest obtained on the capital invested are considerably below those expected by the timber operator of today, who must, of course, face business conditions as he finds them.

And so it may well be a question whether the State must not eventually advise and assist in the administration of the bulk, if not all of the lands chiefly valuable for the production of timber, at least whenever the manner in which they are handled affects not only the individual owning them, but also many other important interests; and in many cases the duty of caring for such lands may necessarily fall at least partly to the State because the individual can not and should not be expected to bear the sole burden of curtailing his profits for the benefit of other interests.

The things we are working for are to protect the timber now standing, and to make the cut-over lands keep on producing timber. A most necessary measure to the protection of private timber holdings in California is a wise enforcement of the clause in the present State law which provides that:

"All lumber companies, corporations or individuals shall, when so instructed by the State Board of Forestry, and at a time and in a manner prescribed by said Board, carefully burn their slashings, by which is meant the tops, limbs and general debris left after lumbering."

The judicious application of this clause would be a long step ahead toward saving millions of dollars worth of privately owned timber from destruction. The clause might well be amended to the effect that if the directions of the State Board of Forestry are not complied with the State may do the necessary burning at the expense of the owner (under the present State law the Counties are liable in this respect for slashings along County roads). It might provide, too, that the slashings shall either be burned or "otherwise safely disposed of," for it is not always necessary or advisable to burn them.

The fire danger, therefore, could be largely removed through a wise application of the present fire law, with slight amendments. Objection to its enforcement could not be seriously considered, for it would mean, simply, that the owner or operator must use reasonable care to protect other adjacent interests just as valuable as his own. The lumbermen of the State, doubtless, would welcome the enforcement of this clause as a means of self protection.

This matter is emphasized because nothing of any value in the way of forest conservation can be brought about until the problem of protecting lands from fire is satisfactorily solved. Fire is the one great enemy which must be conquered before any practical results are possible. A vast amount of good has already been done in California through a gradual change of sentiment in this respect. Only a few years ago, for example, people were careless with camp fires and paid little or no attention to a forest fire speading over the mountains. Fires were numerous all over the State and in many cases were considered necessary. Things are quite different at present, and a forest fire is looked upon as a great calamity. This change of sentiment, of course, has been brought about by a campaign of education, which should be kept up most vigorously, for there is still room for improvement. Together with this change of sentiment should come a system of paid fire fighters. The State should be covered with men who make it their business, and their only business during the dangerous season, to watch for and fight forest fires. As in all other undertakings, organization and system in this matter are absolutely essential.

Another most useful measure would be the formation of an association among the timber owners for common protection against fire; at common expense. Such an organization is already accomplishing much in Washington, Oregon, Idaho and Montana, and there is no reason why excellent results should not follow in California.

Assuming that it is feasible to protect the timber already standing, the next question is, what can we do to bring about such conditions as will warrant the timber owner in logging his lands conservatively with the view of holding them and protecting them as a good business investment until the next crop is ready for the ax? We might do two things: First co-operate with him in protecting his lands against fire, and second, reduce the taxation on cut-over lands to such an extent as will make it profitable to hold them for the next crop of timber. Let the State and the timber owner or lumbermen's association combine and establish an efficient and a well-paid fire patrol. The trouble with the present State fire patrol

is that it is almost entirely voluntary; you can not get anything worth while without paying for it, and if the State contributes its part it means that the farmer, the miner, the waterpower developer and all the other industries affected contribute their part.

And now about taxes. Of course, the only object in reducing taxation should be to make it worth while to keep trees growing on cut-over lands. It would be foolish, would it not, to reduce or remit taxes on lands which might be slashed to pieces, burned up and made barren and non-productive for all time? A reduction in taxation, therefore, should be made only in case the timber owner agrees, in co-operation with the State, to log off his land so as to leave it in good condition for the production of another crop, and after this is done, also in co-operation with the State, to protect the coming crop against fire. In other words, does it not hold that the State is justified in helping the private owner only in case the private owner agrees to handle his property so as to give reasonable assurance that it will continue to be timber producing.

Whenever such an agreement is made the State would be justified in reducing taxes very materially on cut-over lands, or, possibly, in remitting them altogether for a period of years. Or taxes could be collected on the timber when harvested, together with a small annual tax on the land, based upon its productive value.

Of course, any considerable reduction or variation in taxation, or its abolishment altogether for a term of years, would seriously upset the financial systems of the counties concerned. To avoid this the State might pay to the counties, yearly, a sum in lieu of taxes, reimbursing itself from time to time through taxes obtained from the owner or from the crop when harvested.

But whatever plan may eventually be found wise and practicable, the chief end in view should be to provide that a reduction in taxation and assistance from the State in protection should be accompanied by such methods of lumbering and such organized protection as will make it reasonably sure that the lands will continue to produce trees instead of becoming waste and non-productive. In the vast majority of cases we can keep trees growing through a natural seeding up of the area from those trees left standing after logging. This is proved by a hundred years of forest management in various countries throughout the world, and by 15 years of prac tical operations on the national forests of this country. In some few cases, artificial planting must be done, but this is expensive, as yet rather uncertain of success, and demands the most intensive and costly kind of protection. Where we can not get a natural re-growth we should by all means plant artificially, but not otherwise. The main thing is to log over the land so as to make sure of a natural new growth.

To carry out suggestions similar to these would, of course, require more or less State machinery, to which some objection may exist. It would mean, however, but a slight enlargement of the present efficient State Forest Service. In order to accomplish anything of substantial and permanent good the State must, sooner or later, play its full part and take its full responsibility.

And one thing more. Whatever schemes are worked out for the general improvement of forest conditions in California should be planned, by all means, in co-operation with the timber interests. With their help and advice everything may be accomplished; without their co-operation little or nothing will result. The timber interests are fully awake to the fact that better forest conditions are bound to come, sooner or later, and they are ready to do their part for the common good. It remains, then, for the State and all the other great interests involved to do their part. The whole question seems to resolve itself into a problem of how the timber owner and the people of California may best co-operate to bring about an immediate and efficient system of protection against fire, and how provision may be made to induce private owners to cut their timber and protect their lands with a view to keeping trees growing.

It seems hardly necessary to emphasize the vital importance of forest lands to the agricultural interests. This is a matter which is felt and thoroughly understood in California. Every drop of water is extremely valuable and a steady flow throughout the season is absolutely necessary for the successful growing of crops. On treeless lands where trees will grow a forest growth should be established as soon as possible; and in conjunction with this work the vast areas of dense chaparral, which in many cases are just as valuable for protection purposes as trees themselves, should be closely guarded from destruction by fire. This means hard work and heavy expense in the construction of trails, fire lanes and telephone lines, and it means, too, the building up of a trained force to fight out this problem on the ground. The people are fully awake to the gravity of the situation and are enthusiastic in their co-operation with the national government. What is needed more than anything else, however, is some definite and workable plan for the co-operative protection and conservative management of private and corporate mountain lands. When this is brought about, conservation of California's forest resources will be assured. Until this is brought about, the ultimate result will remain in doubt. The national government is doing what it can with the means at its disposal, but the final responsibility rests squarely with the State of California.

F. D. Cornell of Los Angeles county, of the Forestry Society of California, spoke on "Eucalyptus Planting in California." He showed that eucalyptus culture was a matter not only of State but of National importance, because of the menace of timber exhaustion. He paid high compliment to the Forestry Service of the Government, and told of its development during the past few years. In speaking of eucalyptus culture he said it was an industry that was sure to be recognized and developed, and divided the growing of eucalyptus into "commercial" and "timber" eucalyptus. After giving a careful resume of the historical and scientific facts relating to eucalyptus, he gave comparisons with various other woods, showing its adaptability for many uses now given over entirely to certain defined species of timber. He called attention to the need of Forestry Service studies where the people could be shown the results of definite work, and defined several methods

of gaining co-operation between the people and the Government.

O. H. Miller, secretary of the Sacramento Valley Development Association, had for his theme, "California's River Problem," and handled it in a thorough manner, going into interesting detail showing the needs of the rivers of the State. He showed the enormous land values at stake and the vast possibilities that were promised in the extensive plans necessary to proper conservation of the rivers and adjacent properties. In conclusion he said:

'What better result could this meeting accomplish than to see that a way is provided for the carrying out of this great Sacramento Valley project—irrigation, reclamation and navigation—all with one mighty effort; a project which, when completed, will forever stand as a monument to what man may do toward the conservation of the natural resources of this great country?"

G. B. Lull, State Forester, addressed the meeting on "Forest Tree Planting in California," and said in part:

"Tree planting has been carried on in California since very early time, but until recently there has been little forest tree planting. Trees, hitherto, have been set out mainly for the purpose of securing protection from the sun and wind, or for ornament, and the production of wood has been only incidental. The tremendous interest which has been aroused lately in forest tree planting is due to the mere general understanding of the growth and uses of various species of eucalyptus, together with an assurance of a market for the material.

"The area within which eucalyptus may be successfully grown is limited first by temperature conditions and, within this range, by moisture conditions. The various species differ in their power of enduring cold, and in their ability to withstand drought, and unless account is taken of their requirements planting can only result in failure. The State Forester examines tracts on request and makes reports and recommendations at the expense of the applicant."

W. W. Mackie, Soil Expert of the United States Department of Agriculture, in speaking on the topic, "The Conservation of California's Lands," said in part:

"Conservation as applied to California soils consists not only of soil conservation, but the development of the soil which is either non-productive or has not yet been made to produce its best yields. To conserve the fertility or productivity of California soils the following methods will have to be employed: Rotation of crops, change of crops, improved cultivation, irrigation, drainage and fertilization. To develop soils which have never been devoted to agriculture such factors as irrigation, drainage, flood protection, introduction of new crops and improved methods of culture will be found necessary. In conclusion some effects of markets, transportation and quality of the population on the conservation and development of the soil resources will have to be known and applied."

Dr. George C. Pardee, former Governor of California, and California member of the National Conservation Commission, spoke in part as follows:

"A year ago last May there was held in the city of Washington a meeting that those who attended believed was of the utmost importance. It was composed of the Governors of the forty-five States of the country, three advisory members from each State, and certain other gentlemen connected with the State governments or prominent in some phase of the conservation problem. Out of that meeting arose the appointment by the then President of the United States, of the National Conservation Commission, and under the direction of the president of that Commission, it is my pleasure to congratulate this body on the hearty activity that it has assumed in the consideration of this problem, and to express the hope that this body will lend its assistance and its encouragement to the work the National Conservation Commission is doing."

The speaker told of the enormous ravages that had been made upon the resources of the country in the burning and cutting of timber, averring that within the life of perhaps some of those present the magnificent redwood forests of California would have been totally destroyed, and in their place nothing left. He made the point that though in the past the forests of California had been regarded as inexhaustible and even though in the aggregate they had been but little affected so far, it was necessary to learn the lesson of conservation. He showed the effect of denudation of forests in particular localities, citing the instances of the country tributary to the Mad and the Eel rivers in Humboldt county, which streams, owing to the deforestation, were raging torrents in winter and spring, destroying property and causing irreparable damage.

"For such work," he continued, "the National Conservation Commission was appointed by President Roosevelt, and this was one of the greatest works that that great man ever did. The Commission was appointed to take stock of the assets of the United States and to lay out a plan whereby those national resources could be preserved and conserved. Our iron, coal, gold, silver, natural oil, etc., are in the earth only in limited quantities; they must eventually be used up, but the forests can be conserved even unto the end of time."

Dr. Pardee traced the steps taken at other times and in other nations to conserve and preserve natural resources, and he cited the case of the State of Maine, whose supreme court had declared that the owners of forests have no right to cut one foot of timber if by doing so the property below, adjacent to a stream, may be injured by such action which may cause the stream to rise and overflow.

George W. Pierce of Yolo county, Chairman of the Committee on United Pacific States, presented the following report:

"Through the California Promotion Committee the commercial organizations of California have been brought into effective co-operation, resulting in great good to the State as a whole, and exemplifying the value of teamwork in State building. Through this co-operation California has not only received wide advertisement, but her many industrial and commercial advantages have received attention in all parts of the civilized world. Her wants, from a governmental standpoint, have been given more attention than could possibly have resulted from the individual

efforts of the local organizations. This effective co-operative work should be carried to a broader sphere of usefulness by its enlargement to cover all the States of the Pacific Slope. This entire region has common interests, financial, commercial and industrial, and it is separated by natural obstacles from the rest of the United States, and differ in many material ways from the rest of the States of the Union. Their needs demand distinctive treatment. Specialization is required in their development. Organized effort is required to make this generally known.

"In order to bring about a concert of action on the part of the seven Pacific States, some general plan whereby the Pacific Slope region may be brought into closer relationship is essential. Such an organization should have its central idea formed around some such plan as has been so successfully followed by the California Promotion Committee in unifying the interests of California. To this end it is suggested that steps be taken by the California Promotion Committee to induce the formation of State Central organizations in Oregon, Washington, Idaho, Utah, Nevada and Arizona, or in such of them as have not already formed such central organizations.

"By means of a campaign of education, carried on through the Press and organizations already established, induce the people, as generally as possible, of all the localities of each of the above named States, to form local organizations, having for their object the upbuilding of each individual locality. Make this organization the unit of working force. Use it in combination as a foundation upon which to build a thoroughly developed State. Following the organization of these local bodies an affiliation should be effected with a central organization whose energies should be devoted to harmonious work looking to the upbuilding of the entire State.

"The seven State Central Organizations, as outlined, will then be in position to reflect the desires of every locality, in their respective States, thus arriving at a definite idea of what is required, either politically, commercially or industrially by the State as a whole. With this knowledge of the needs of the various States concentrated into seven organizations a United Pacific States Central organization should be formed, with one representative from each of the seven State Central organizations. This United Pacific States central body should meet and decide upon all matter requiring concerted action, and then pledge the entire strength of all the local organizations of each of the seven States to assist in carrying out the conclusions reached. Such co-operation would enlist the active assistance of every United States Senator and every Congressman from the Pacific Slope. Every matter in which Federal aid is desired would be decided upon by the United Pacific States central body, thus giving any request, from any part of this section, a powerful backing in Washington, not only in Congress but in the departments as well.

"The benefits certain to accrue from the co-operation outlined are obvious. These would be constantly increased as the strength and importance of the central organization became apparent. Benefits arising from interchange of commodities, and the broadening of commercial relations would soon be realized, while the growth of the entire region would become a matter of common interest and general solicitude, as all parts became more interdependent and mutually helpful."

REPORT OF COMMITTEE ON GOOD ROADS LEGISLATION

The following report was submitted by the Committee on Good Roads Legislation, appointed at the meeting held at Los Angeles last November. The Committee is composed of H. A. van C. Torchiana, Santa Cruz, chairman; J. M. Eddy, Stockton; Samuel G. Buckbee, San Francisco; W. E. Gerber, Sacramento, and F. W. Blanchard, Los Angeles.

"To the Counties Committee of the California Promotion Committee:

"The Legislative Committee on Good Roads begs leave to submit the following report and recommendations:

"The most important legislative action relating to good roads in California, passed by the State Legislature at its recent session, was Assembly Bill No. 990, authorizing the construction, acquisition and maintenance and control of a system of State highways, and the expenditure of $18,000,000 therefor. This is to be ratified by the people at the next general election, authorizing the State to issue bonds for the purpose of carrying out the provisions of the act. This will mean a system of roads which will cover the State and unite with County roads, and will place California in the forefront of States noted for good highways.

"Other bills of minor importance, such as Assembly Bill No. 991, Senate Bills Nos 7, 61, 128, 215, 242, 322, 332, 355, cover specified short roads to be built by the State in various parts of the State.

"All these bills are progressive steps in the plan to have a splendid system of highways in California, and all of them are commended.

"In addition to this legislative action the California Promotion Committee has prepared and circulated for signatures a petition to the Secretary of the Interior asking that automobiles be permitted to use the roads in Yosemite Park, under proper and suitable regulations. This petition is in the hands of the secretary of this meeting, and we recommend that it be generally signed by representatives of the organizations here assembled and be endorsed by this meeting."

The special interest of the report of the Committee on Highway Tree Planting, appointed at the Los Angeles meeting, as presented by Prof. Willis L. Jepsen, of the University of California, chairman of the Committee, lies in the selection of roads on which to initiate the plan of State-wide planting of highways. Two highways are designated as main axes for tree planting, the work to be gradually extended to branch roads and connected up with subsidiary axes in various parts of the State. The two main roads are El Camino Real, from Los Angeles to San Francisco, and the second the main highway along the east side of the Sacramento and San Joaquin valleys from Redding to Bakersfield, and connecting the most important cities of that region, threading a rich agricultural area and with direct highways to the towns of the gold and timber belt of the Sierra Nevada.

Planting should be done under the provisions of a recently enacted law by which boards of supervisors

are empowered to appoint a County Board of Forestry of five persons, and provide appropriations therefor. The County Board of Forestry appoints a County Forester, whose duties are especially concerned in highway trees, and whose term of office is at the pleasure of the Board. Failing favorable action of a Board of Supervisors, Improvement Clubs are expected to make beginnings on the plan in the way of planting to serve as model highways designed to have educational effect on the community.

The plan as a whole is expected to appeal to the imaginations of the people of California, since it will, when carried out, give us a system of highways the like of which exists in no other country on so great a scale.

At the conclusion of the meeting the following resolutions were offered and unanimously adopted:

Resolved, That this gathering strongly endorses the plan proposed by the National Rivers and Harbors Congress for the issuance of Government bonds in the sum of $500,000,000 for the improvement of the navigable rivers of the United States, believing said plan to be the most feasible yet proposed for securing much needed improvement of the interior waterways of our country, and we request our Senators and Representatives in Congress to use every legitimate means to bring about such a bond issue.

Resolved, That we heartily endorse the work of the United States Weather Bureau, and cordially recognize its services, which have been of inestimable value to the people of the State of California.

Resolved, That this Counties Committee of the California Promotion Committee cordially approves the development and carrying on of the policy of conserving the naturaly resources of the country, particularly its various mineral resources and the fertility of the soil, and commends the excellent work that has recently been done in that direction, believing that the end should be kept strictly in view that all such developments, in common with the other resources of the country, are for the advantage and benefit of the people residing in the districts where such resources exist, and are developed, and that such developments should be made with the end in view that such resources and the products of the same should be available to the people at the least possible cost and as widely distributed and enjoyed as the natural conditions would permit.

WHEREAS, The storage of water by companies engaged in the development of electric power, where such storage is upon the tributaries of the principal streams of the State, tends in a large degree to withhold the flood waters of such streams, and therefore reclaims and prevents the overflow of large districts of land needing reclamation, and the water so reserved and withheld is added later on to the natural flow of the streams in the dry seasons of the year, thus increasing the supply available for irrigation and other beneficial uses; therefore, be it

Resolved, That this Committee of the Counties Committee of the California Promotion Committee endorse the recent action upon the part of the United States Government making a reduction in the charges imposed upon the electric power where the same is developed by the use of such stored water, as we believe that all such beneficial enterprises should be encouraged to the end that the largest development of our natural resources may be obtained and the cost to the consumer reduced.

Resolved, That we heartily thank the United States Congress and our State Legislature for the Acts passed and the appropriations made to conserve, protect and foster the viticultural industry of this State and of the Nation.

Resolved: WHEREAS, The commercial culture of the eucalyptus trees in California has reached such large proportions, and is certain to assume so prominent a position in the future economy of the State and the Nation, and,

WHEREAS, There is a lack of absolute and official data on the subject of choice of species for given conditions and situations, and information concerning specific value of the many species, and their comparative values for specific and special purposes as regards the California-grown timbers; now, therefore, be it

Resolved, That the Forest Service of the National Government be asked to, at the earliest possible moment, institute most comprehensive tests and experiments in order that this official data may be placed at the service of the State, and be it further

Resolved, That it be requested that such investigations and tests be broadly commercial in their bearing, rather than technical, and that the results of such tests be published as rapidly as obtainable.

Resolved, That the Counties Committee approves of the appointment of the National Conservation Commission and desires cordially to co-operate in its work.

Resolved, By the Counties Committee, that the report of the Committee on Tourist in California, Committee on Good Roads, the Committee on Highway Tree Planting, and the Committee on United Pacific States be adopted, and that the California Promotion Committee be requested to carry out these several reports. Be it further

Resolved, That the Committee shall receive the thanks of this meeting and be discharged.

WHEREAS, Through the courtesy of the management of the Hotel Del Monte, this eleventh meeting of the Counties Committee of the California Promotion Committee has been greatly facilitated, and the delegates have been given most delightful surroundings,, and

WHEREAS, Invitations have been received from the Chamber of Commerce of Monterey and the Board of Trade of Pacific Grove, to participate in certain entertainment, and

WHEREAS, This entertainment will follow the business meeting of the Counties Committee, consequently be too late to allow of this formal action, be it

Resolved, By the Counties Committee of the California Promotion Committee in Eleventh Semi-Annual meeting assembled, that the thanks of the organization be, and are hereby, tendered to the management of he Hotel Del Monte and to the Chamber of Commerce of Monterey, and the Board of Trade of Pacific Grove for these courtesies, and be it further

Resolved, That the secretary be instructed to so notify the management of the Hotel Del Monte, and the Chamber of Commerce of Monterey and the Board of Trade of Pacific Grove, and also give copies of these resolutions to the Press of the State with the request that they be given full publicity.

RESOLUTION OF THANKS TO THE PRESS.

WHEREAS, The Press of California, together with the Associated Press and United Press Associations, have been constant and faithful workers in the cause of upbuilding California, and

WHEREAS, The unselfish and persistent good work of this mighty force in civilization should be fittingly recognized on all occasions, be it

Resolved, By the Counties Committee of the California Promotion Committee, in Eleventh Semi-Annual meeting convened, that the heartfelt thanks not only of this Committee but of every Californian, in whatever walk of life he may be, is due to the Press and the Press Associations. Be it further

Resolved, That in acknowledgment of that due, the Comties Committee of the California Promotion Committee hereby extends to the Press of California and the Press Associations, its thanks and appreciation, on behalf of the two hundred affiliated organizations, representing every county in the State, and be it further

Resolved, That copies of this resolution be sent to the Press with the request that it be given publicity.

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POWER AND GAS

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PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Conservation Vital to Power Companies

The resolution adopted by the Counties Committee of the California Promotion Committee at the semi-annual session held at Del Monte on Saturday last, and as printed in another column of the Journal, commendatory of the action of the government in lessening the charge to power companies for uses of the forest reserves of the government, while admirable of itself, does not go far enough.

In appreciation of the services rendered by the power companies indirectly to the government in its schemes of reclamation and irrigation and in the conservation of the forests, and directly to the people of the State of California, who are immeasurably benefited by the policies of the power companies, it must be remembered that the pioneers of hydro-electric transmission and natural conservation of the flood waters have been the power companies of this State.

Taking advantage of the earlier installations of reservoirs, ditches and flumes built by the hardy pioneers in mining, the power companies have been enabled to do more in the way of conservation than has as yet been accomplished by the government, and in the natural trend of the increase of its business, will, in their own protection, do still greater things.

The reforestation of the watersheds of California, denuded by the demand for timber, is as much to the interest of the power companies as it is to the people in the valleys, and the larger the reservoirs are built, and the more water impounded during the run-off of the winter months by the power companies for the purpose of establishing a high load factor at their plants, is of inestimable benefit to those living contiguous to the rivers of California by the prevention, through conservation of the wasteful floods in winter, and by the added quantity of flow to the rivers during the dry season, when the reservoirs of the power companies are drawn upon for power purposes.

The policy of the government toward the hydro-electric companies of the State should be of the most liberal character, and if a liberal policy is employed, it will be found that the power companies, in self-interest, will act in greater harmony with the government in all of the purposes towards which conservation is the factor.

Unjust Criticism

The report of Messrs. Cory and Hunt submitted to the Board of Supervisors of the City and County of San Francisco with reference to the complaints of consumers of the gas companies supplying the city, and published in this issue of the Journal, is the most fitting reply to the unfair, prejudiced and unwarranted attacks made upon those companies in the wild hysteria of present attitude of the daily papers towards all public service corporations.

It is pleasing to note that the verdict rendered by Messrs. Hunt and Cory entirely exonerates the gas companies from any of the many crimes charged against them, both by press and unreasonable consumers, and it is also a matter of congratulation, as indicated by this report, that the quality of gas, both in candle power and its high efficiency in heat units, furnished the people of the city and county of San

Francisco, is superior to that furnished anywhere in the United States, which is a true indication of the fairness of the lighting corporations towards the public.

In the development of the Welsbach burner and of gas appliances for heat, the necessity for a large number of B. T. U.'s has been made imperative, and the changes of manufacture of gas in the State of California, due to cheap oil, has made this possible.

In England a 14 c. p. gas of 450 B. T. U.'s is deemed an excellent quality of gas to be delivered by the company, and in the Eastern States, as a rule, the B. T. U.'s do not exceed 500 and the c. p. 18.

It is but reasonable to suppose that the hysterical attacks made by the daily press upon the company in other matters than that of the quality of its gas, are about as near correct as their charges have been proven to be in these particular instances.

All of this leads up to the absolute necessity for some amendment of the present laws, and particularly of the Constitution of this State, which will permit of the placing of public service corporations within the control of a Board of Commission, similar to that existing in Massachusetts, Wisconsin and other States, so that full justice may be done by impartial investigations, both to the companies operating and to the consumers, to the end that the daily bickerings between public and corporations may, by judicial enactment, be removed from the domain of prejudice, and put upon that high plane which will give to the companies a just return upon capital actually and honestly invested and to the consumer a low rate consistent therewith and a character of service that cannot be attacked.

NEW CATALOGUES.

The steady growth of the Weber line of electrical specialties is demonstrated by Catalogue No. 2 covering this line issued under date of May 10th by Henry D. Sears, General Sales Agent, 131 State street, Boston, Mass.

It covers in detail their complete line and includes sockets, receptacles, both weatherproof and pendant, rosettes, fuse plugs, plug cut-outs, and a very complete line of wiring knobs and insulators. It is very conveniently arranged and of a handy size for the pocket or desk pigeon hole. The price list which accompanies it is uniform with the catalogue and is so designed that it can be readily inserted in the back.

Typographically it is an excellent and artistic piece of work and is in keeping with the Weber line of specialties.

The merits of tantalum lamps for train lighting are emphasized in a recent pamphlet issued by the General Electric Company, Schenectady, N. Y.

In point of efficiency, it is there stated, the tantalum lamp is much superior to the ordinary carbon filament lamp, consuming but 2 watts per candle of light against 3 to 3½ watts for the carbon filament lamp. Its average life is materially longer than that of the ordinary carbon train lighting lamp, and moreover its light is of a superior brilliancy and illuminating value. For example, the 35-watt carbon lamp gives 10 candlepower, whereas the 25-watt tantalum gives 12½ candlepower, or the tantalum lamp consumes 30 per cent less current but gives 25 per cent more light than the carbon filament lamp, and its light is of more attractive and agreeable quality.

The tantalum lamp can be substituted for carbon lamps without any changes in the voltage, wiring or sockets. It is made in general in the same types and voltages as the present carbon lamps, so that its trial is a simple proposition.

PERSONALS.

W. F. Murphy, General Manager of the Idaho Consolidated Power Company, has returned to Pocatello, Idaho, after spending several weeks upon the Pacific Coast.

J. C. Kirkpatrick, president of the National Pole Company of Escanaba, Mich., and the American Cross Arm Company of Chicago, is expected in San Francisco during the coming week.

Mr. E. G. Dewald, manager of the Water Wheel Department of the Platt Iron Works of Dayton, Ohio, is in San Francisco in the course of a trip during which he will cover the entire Pacific Coast.

J. J. Foley, in charge of the Telephone Installation Department of the Western Electric Company on the Pacific Coast, has just returned from a trip of several weeks in the neighborhood of Butte, Montana.

Thomas G. Grier, Western agent for the American Circular Loom Company at Chicago has just returned from a six weeks' trip to Bermuda, Cuba and Porto Rico and reports a pleasant time and renewed health.

Kempster B. Miller of Chicago is making a short trip to California, where his firm of McMeen & Miller has extensive telephone work under way. Mr. Miller will combine both business and pleasure during his brief stay.

Chas. J. Thelan, for the past five years connected with the Brooks-Follis Electric Corporation of San Francisco, and Stephen E. Gamble, owner and manager of the Sebastopol Electric Light Company of Sebastopol, Cal., have organized the Eureka Electric Construction Company to engage in electrical construction work of every description at Eureka, Cal.

B. Elshoff, for twelve years assistant superintendent of the Allis-Chalmers-Bullock Company, of Cincinnati, and for the past two years superintendent of the electrical department of the Allis-Chalmers Company of Milwaukee, has recently severed his connection with the last named company. Mr. Elshoff may eventually accept a position with an eastern firm but for the present will remain in Milwaukee.

H. C. Rice, author, playwright, poet and, incidentally, vice-president of the General Incandescent Lamp Company of Cleveland, Ohio, is spending a few days in San Francisco. In addition to devoting the necessary amount of time to the above occupations, Mr. Rice finds opportunity to take a great deal of interest in running horses, of which he is a great admirer. The accompanying portrait shows him in riding costume and is from a snap-shot taken just after a short dash on his favorite running horse "Comet." Mr. Rice will spend two or three weeks on the Coast partly on pleasure and partly in the interest of the General Incandescent Lamp Company.

H. C. Rice.

O. W. Lillard of the San Francisco office of the Gould Storage Battery Company is in Los Angeles, where he will remain until the latter part of May superintending the installation of the storage battery plant of the Home Telephone Company there.

Richard T. Laffin has become associated with the Stone & Webster Management Association in connection with the Seattle Electric Company and other Puget Sound railway and lighting properties. Mr. Laffin was for many years connected with the Boston Elevated Railway, and was later general manager of the Worcester Consolidated Street Railway. He resigned from the latter position to become vice-president and general manager of the Manila Electric Railroad, and spent about four years in the Philippines in establishing and organizing the property, having only recently returned to this country.

Character and Quality of Gas Furnished to the City of San Francisco

We give below the joint report of A. M. Hunt and C. L. Cory, consulting engineers, on the character and quality of gas furnished to the city of San Francisco, with special reference to complaints against high bills during the months of December, 1908, and January and February, 1909.

San Francisco, April 9, 1909.

To the Committee on Artificial Lights, Board of Supervisors, City and County of San Francisco, California.

Gentlemen: At your request, we have made as full an investigation as possible into the character and quality of the gas supplied in the city of San Francisco, with especial reference to the complaints of high bills during the months of December, 1908, and January and February, 1909.

There being no records available for the months in question, except those of the companies supplying gas, we have been compelled to use their records, supplementing them with such investigations as we have been able to make ourselves during the past three weeks.

The results of our investigations have been negative so far as disclosing any general condition that could account for abnormal bills during the past winter, *except that the winter months are always those of maximum use of gas, and that the months of January and February were abnormal as regards the large amount of cloudy and cold weather.* It is also a fact that the San Francisco Gas & Electric Company have since July, 1908, been collecting a rate of $1.00 per thousand for gas, while for two years prior to that date, they had collected only 85c per thousand. The increase of rate amounts to about 17 2-3 per cent. The average increased use during the months above noted cannot be determined, but that it was materially higher than for the same months of a normal winter is certain.

The time and facilities available made it impossible to test a sufficient number of meters (there being over 60,000 in use) to ascertain the average accuracy of all the meters in use.

Our method of procedure in reference to meter testing was as follows:

We received from various sources eighty-one complaints of high bills. Of these, twenty-four were selected, after investigation of the data, and the meters were taken out and tested by us, using a standard meter prover.

Seven of the meters were found correct within one per cent; twelve were fast, the average being 2.87 per cent; and five were slow, the average being 4.2 per cent. The maximum percentage fast was six per cent, and the maximum percentage slow was seven per cent.

The facts disclosed do not show a condition of affairs as regards the meters which can be considered as serious.

The most flagrant case, so far as appearances go, brought to our notice was one in which the bill from January 12th to February 12th, 1909, was given as $1.70, and from February 11th to February 26th, 1909, as $11.85. On this latter date, the customer discontinued his service with the company which had been supplying him and took gas from the other company.

An examination and analysis of his bills for the periods preceding and following the dates above given are instructive, as noted below.

STATEMENT OF GAS ACCOUNT.

Meter set March 12, 1908, at zero.

	Date.	Cu. Ft. used.		No. of days.		Rate per 1000.	Cu. Ft. per day.		Charge.
	Apr. 13th.	20,200		32		75c	631		$15.15
	May 13th.	20,200		30		75c	670		15.15
Changed	June 11th.	32,400		29		70c	1119		22.70
6/19. Test	July 14th.	18,800		33		80c	570		15.05
2% fast.	Aug. 14th.	10,400		31		80c	335		8.30
	Sept. 14th.	14,400		31		80c	464		11.50
	Oct. 14th.	10,800		30		80c	360		8.65
	Nov. 13th.	17,400		30		80c	580		13.90
	Dec. 11th.	25,200		28		75c	900		18.90
	Jan. 12th.	9,400		32		85c	294		8.00
Changed	Feb. 11th.	2,000	16,800	30	45	85c	63	373	1.70
2/26. Test	Feb. 26th.	14,800		15		80c	987		11.85
5% slow.	Changed to other company.								

Meter set February 24, 1909, at zero.

	Mar. 9th.	10,800		13		75c	830		8.10
	Mar. 24th.	12,600		15		75c	840		9.45

The quality of gas supplied by both the San Francisco Gas & Electric Company and the Metropolitan Light & Power Company is excellent.

On March 23rd, 1909, the gas being delivered into the mains by the S. F. G. & E. Co. had a candle power of 23.6 with a gross heat value of 710 British Thermal Units. The records of the company for the past year indicate that this same high standard has been maintained during that period.

The gas of the Metropolitan Light & Power Co., on April 6, 1909, had a candle power of 18.8 and a gross heat value of 651 British Thermal Units. From the company's records the average candle power for the month of December, 1908, was 19.13; for the month of January, 1909, 19.58. The average gross heat value (also from the company's records) during these months was, December, 1908, 652 British Thermal Units; January, 1909, 690 British Thermal Units.

It can be definitely stated that the gas supplied by both these companies is of as high or higher quality as regards heat value than any artificial gas supplied to any other community of which we have been able to find records.

The analyses of the two gases obtained by us are appended. The question has been raised as to the amount of carbon monoxide contained in the gas supplied in San Francisco. The analyses obtained by us show that the gas sent out by the S. F. G. & E. Co. contained 12.6 per cent carbon monoxide on March 23rd, 1909, and that of the Metropolitan Co. 4 per cent on April 6th, 1909. In practically all the large communities of this country, except on the Pacific Coast, the gas is made by what is known as the carburetted water gas process, and usually contains about 26 per cent of carbon monoxide. *It will be seen that both the gases supplied in San Francisco contain only a fraction as much of this component as exists in the bulk of the gas which is distributed in Eastern communities.* The relatively larger amount contained in the gas of the S. F. G. & E. Co. as compared with that of the Metropolitan Co. is due to the fact that the former company

NOTE BY SAN FRANCISCO GAS & ELECTRIC COMPANY.

From the accompanying report of two able and disinterested experts it is demonstrated that the character of gas supplied by the San Francisco Gas & Electric Company is better than the average standard of gas furnished elsewhere in the United States, both as to its candle power and heat-giving qualities. It is also apparent that the very vicious criticism of the company was totally undeserved and unwarranted.

The aim of the company is to give good service, and it invites at all times honest criticism and complaints of consumers, and will endeavor to right any and all wrongs, its motto being:

"Solve all doubts in favor of the consumer."

JOHN A. BRITTON, President.

manufactures both oil gas and carburetted water gas, which are mixed before being distributed.

An examination of the analyses shows that neither gas had been admixed with air. It is not generally known that the admixture of air with an illuminating gas cuts down its candle power very rapidly. To illustrate this we had candle power tests made on gas containing various percentages of air. Results are given in the table below.

% of air mixed with the gas.	Loss of candle power in % of that of unmixed gas.
1%	8%
3%	16%
5%	26.2%
8%	33.8%
12%	58.7%
15%	71.1%

It is readily seen that any attempt to dilute the gas with air to increase its volume by any appreciable amount will be accompanied by such a serious loss of candle power as to betray the fact at once.

It has been claimed that a gas company can, by increasing pressure on its mains, force gas through the meters into the house pipes, and that this gas will, when the pressure is again lowered, pass back into the mains, the net result being that the meter records gas that has not been used. To ascertain if this be possible, we connected the outlet of a new and tested meter to a tank having a volume equal to the entire pipe system of an average house. The inlet side of the meter was connected to a small tank containing gas, in which the pressure could be varied from a low pressure (1½ inches of water) to the maximum pressure on the mains. After carefully noting the position of the pointer of the test dial of the meter, the pressure was varied between the extreme limits ninty (90) times. This would represent the probable number of fluctuations of pressure in the mains during the period of a month, arising from the three peaks per day caused by the heavy demand for gas for cooking. *At the conclusion of the test, the pointer had apparently not moved at all. The test was a severe one, and eliminates the above theory completely.*

A test was made to determine the effect of the change of pressure of gas upon the economy with which it is used in an ordinary gas range for general cooking purposes. In this test the pressure of the gas was artificially varied through a wide range, from a minimum of .5 inch to 6.1 inches of water, or a total variation of 5.6 inches. The adjustment of the burner was so made as to give what was considered the most satisfactory gas flame under a four-inch pressure, and all of the tests were made with no change whatsoever being made in this arrangement of the burner.

In order to measure the amount of gas required to do an equal amount of heating under the different pressures, one gallon of water was in each case heated in an ordinary granite-ware tea kettle, and enough gas was burned to increase the temperature of the water 100 degrees Fahr., the initial temperature of the water in each case being about 60 degrees Fahr.

During the test the amount of gas used was measured by both a new meter which had previously been tested, and found correct, and by the prover, which is ordinarily used for testing the accuracy of the meters.

The complete results of these tests are given below:

Pressure. of Gas.	Cu. Ft. of Gas.	Time Required.
0.5 inch	3.45	19 min. 46 sec.
2.0 inches	3.80	9 " 32 "
4.0 "	4.35	8 " 4/5 "
6.1 "	4.24	5 " 52 "

An examination of the results of the test shows conclusively that while the length of time required to heat the given quantity of water was much greater for the lower pressures, yet the amount of gas consumed was less at the lower pressure, *so that the claimed excessive bills during December and January could not have been due to the extreme low pressure.*

In this connection it should be noted that the maximum fluctuations of pressure found by us, after taking simultaneously twenty-four records at five different places, was in the Richmond district, on Twenty-fifth avenue, north of Lake street, which on April 1st showed a fluctuation of 6.4 inches.

We earnestly recommend that the city establish a laboratory and equip it with instruments so that the city gas inspector can make regular tests. Such a laboratory should be located at a point where service pipes may be run in from the mains of both companies supplying gas. It should be equipped with the following instruments:

One (1) standard 5-ft. meter prover, complete.
One (1) 100-inch standard bar photometer.
One (1) candle balance.
One (1) Pentane lamp, 10 candle power.
One (1) Junker calorimeter, for gas.
One (1) Hempel gas analysis apparatus.
One (1) dozen sample tubes for gas.

The necessary supply of glassware, re-agents, tubes, etc. In addition to the above there should be provided at least four seven-day pressure recording gauges and two 24-hour pressure recording gauges.

The above equipment will cost installed not to exceed two thousand dollars ($2000.00).

The gas inspector should be required to make analyses, candle power and heat value determinations of the gas at least three (3) times each week, keeping permanent record of his results. The four seven-day pressure gauges should be installed at carefully selected points and continuous records of the pressure obtained at these points should be kept on file. One of the 24-hour gauges should be installed in the laboratory, the other being available for use at any point from which complaints of low or heavily fluctuating pressure are received. The total lack of such data as is noted above has made it impossible for us to ascertain the conditions obtaining during the past winter, when gas consumption was heavy and complaints of high gas bills were most frequent.

In conclusion we can only report that we have discovered no facts which indicate that the gas companies have during the past winter done anything which would increase the amount of gas used by consumers. The gas at present supplied is undeniably of high quality, and the records of the companies substantiate their claim that this was also the case during last December, January and February.

The results of our meter tests qualify the statement that the meters in use are of good, reliable make, and record correctly within the commercial limits of accuracy.

Undoubtedly there have been, and will always be, sporadic cases where complaints are just, and gas meters will also be found which record incorrectly.

The San Francisco Gas & Electric Company and the Metropolitan Light & Power Company have shown us every courtesy and accorded us every facility asked for.

Respectfully submitted,

A. M. HUNT,
C. L. CORY.

Analysis of gas at works of S. F. G. & E. Co. March 23, 1909.

Heavy hydrocarbons	10%
Marsh gas	32%
Hydrogen	36.1%
Carbonic oxide	12.6%
Carbonic acid gas	3.4%
Oxygen	0.2%
Nitrogen	5.7%
	100.0%

Candle power—23.6. Heat value—710 B. T. U.

Analysis of sample of gas taken from S. F. G. & E. Co.'s mains at 3245 Twenty-first street.

March 31st, 1909.

Heavy hydrocarbons	8.4%
Marsh gas	32.5%
Hydrogen	39.0%
Carbonic oxide	10.2%
Carbonic acid gas	3.2%
Oxygen	0.2%
Nitrogen	6.5%
	100.0%

Heat value—686 B. T. U.

Analysis of samples of gas taken from the mains of the S. F. G. & E. Co. at 154 Lake street on

March 31st, 1909.

Heavy hydrocarbons	8.6%
Marsh gas	32.1%
Hydrogen	38.5%
Carbonic oxide	11.2%
Carbonic acid gas	3.0%
Oxygen	0.2%
Nitrogen	6.4%
	100.0%

Heat value—687 B. T. U.

Analysis of gas of Metropolitan Light & Power Co.

April 6th, 1909.

Benzene	1.2%
Acetylene and other illuminants	5.6%
Carbon monoxide	4.0%
Methane	35.2%
Hydrogen	40.9%
Carbon dioxide	2.2%
Oxygen	1.5%
Nitrogen	9.4%
	100.0%

Candle power—18.8. Heat value—650.8 B. T. U.

STANDARD OF GAS ESTABLISHED.

Under an amendment to the Gas Rate Ordinance for next year, recently adopted by the Board of Supervisors of San Francisco, gas must be of 19 candle power and have not less than 600 British thermal heat units. Failure to maintain this standard will render officials of the local gas companies guilty of a misdemeanor and places them in position where they must defend themselves against action which may be brought by any consumer.

BELGIAN STEEL WORKS ADOPT ELECTRIC FURNACE.

Consul H. Abert Johnson reports that the important Belgian steel works of the Cockerill Company, in Liege, have just started an electric furnace, which he describes:

This furnace is built on the Girod system, with one electrode, and has a charging capacity of from two to three tons of steel. The dynamos furnishing the necessary electric current—an alternating current of 50 volts—are operated by gas motors, utilizing the gas from the blast furnaces. The electric furnace is placed in a specially constructed building in close proximity to the steel converters, with which it is connected by a traveling crane, with a truck arrangement for transporting the ladles to the converters, which, when filled with molten metal, place it directly in the electric furnace.

NATIONAL ASSOCIATION STATIONARY ENGINEERS.

San Francisco, Cal., May 6, 1909.

Cal. No. 3, N. A. S. E. held a regular session on May 5th and among other matters of interest to the engineers which were transacted was that of the election of delegates and alternates to the State Convention to be held in San Francisco in June. They are as follows:

Delegates: H. D. Saville, Wm. P. Millner, Chas. Knights, J. B. Williams.

Alternates: David Thomas, C. E. Van Meter, P. J. De Lasaux, W. N. Munro.

Brother H. D. Saville, President of the State Association, accompanied by President Millner of Cal. No. 3, Mr. Chas. L. Turner, and a number of other engineers, visited California Association No. 8 of Stockton during the past week, and the visitors were right royally received by the Stockton contingent. This visit was made in pursuance of President Saville's settled policy, to foster the spirit of fraternity, sociability and mutual education in all things which pertain to engineering in which is embodied the fundamental principles of the National Association of Stationary Engineers.

Yours fraternally,

DAVID THOMAS, Recording Secretary.

San Francisco, No. 1, N. A. S. E., has elected the following named members as delegates and alternates to attend the State Convention to be held in this city next June: Delegates—John W. Maher, Louis Honigbaum, Conrad Witzel, Chas. Bankey, A. T. Peery, John T. Stewart, Theodore Heins. Alternates—Geo. James, W. H. Kearney, David Hanley, Dan Murphy, Claude Bregard, F. H. Cherry, Fred E. Kuhl.

At the meeting of May 1st, President Maher interested the members with a brief talk, explaining the starting mechanisms of different kind of electric motors—alternating and direct current. The subject was very interestingly handled, although being entirely impromptu, in response to a question by one of the members.

The headquarters of the employment committee has been removed from the store of the Squires & Byrnes Company, on Steuart street, to the engine room of the Grant building, on Market street, and D. W. McCarthy, chief engineer at the Grant building has been appointed chairman of the employment committee. A telephone has been placed at the headquarters for the convenience of members and employers who wish to obtain engineers at short notice. The telephone number is Market 6714.

Owing to the expiration of the lease of the hall at 933 Market street and the desire of the landlord to convert the premises for other uses, the association is compelled to move its meeting place. A committee has been appointed to find suitable quarters and are meeting with some difficulty in finding a satisfactory hall for Thursday nights.

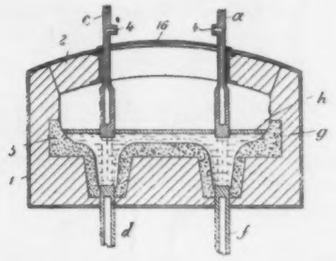
The death is announced of Mr. Ira Watts, National secretary-treasurer of the life and accident department N. A. S. E. Mr. Watts, who had been engaged in a consulting business at Spokane, Wash., had been identified with the National Association for many years and was well known throughout the country to the engineering fraternity. He was formerly chief engineer of the Knickerbocker building, New York.

A. T. PEERY, Secretary.

Stockton No. 8, National Association Stationary Engineers, have elected the following members as delegates and alternates to attend the State Convention to be held in San Francisco: Delegates, G. C. Turner, William Griffith; alternates, J. E. Kelly, S. Bunch.

PATENTS

920,078. Electrical Furnace. Hans Nathusius, Friedenshutte, near Morgenroth, Germany. In an electric furnace, a hearth, a cover therefor provided with slots, electrodes

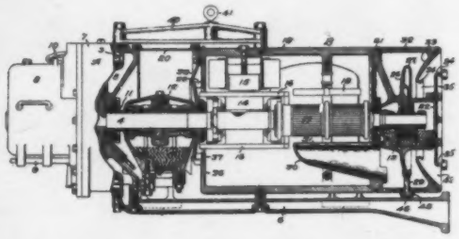


arranged to be guided by said slots, and additional electrodes to cause electric current to pass through and around material contained in the hearth.

920,005. Plug-Fuse. Harry U. Badeau and Frederick P. Poole, Bridgeport, Conn., assignors to The Bryant Electric Company, Bridgeport, Conn. A ventless fuse plug, having a cup-shaped insulating body with terminals and containing

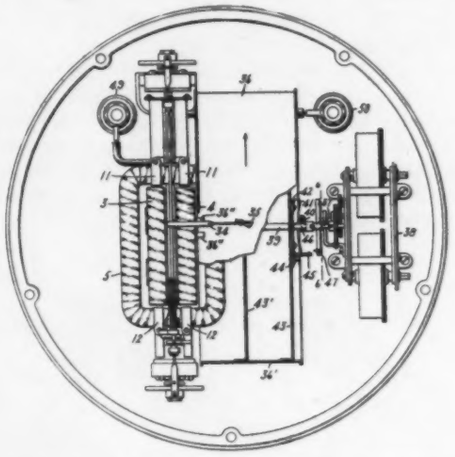
within it only a flat fuse strip, having at a point within the cup a reduced cross-section for the melting-point, in combination with an inclosing cover.

920,052. Turbo-Generator. Brace H. Hamilton and William E. Ver Planck, Lynn, Mass., assignors to General Electric Company. In combination, a dynamo-electric machine having poles, an armature and current collecting devices together with a cylindrical casing or frame inclosing the same, a cylindrical head for the casing, a nozzle projecting from the inner wall of the head into the casing which receives air from the interior of said head and has its discharge



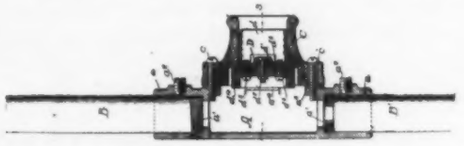
opening extending adjacent the armature and current collecting devices, and a baffling device intermediate the air inlet and the nozzle for preventing the entrance of foreign matter with the air to the interior of the machine comprising a cylindrical plate centrally located adjacent the outer edge of the head, another centrally located plate substantially parallel to the first, and a plate projecting inwardly from the outer edge of the periphery of the head into the space between the parallel plates and having a central opening of less diameter than the outer diameter of said plates.

920,084. Recording Instrument. William H. Pratt, Lynn, Mass., assignor to General Electric Company. In an electrical instrument, the combination with a movable coil



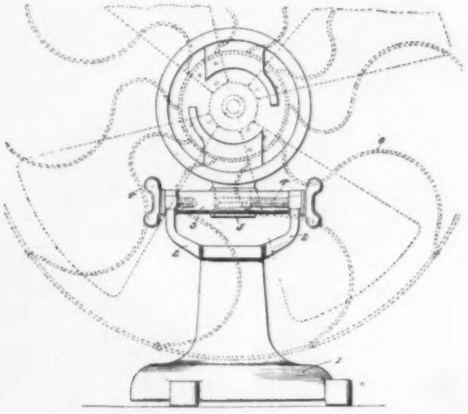
of stretched wire passed near its fixed or stationary ends through bearings on the body of the coil, means for supplying electrical current to the coil.

919,940. Outlet-Fixture for Conduits. Henry T. Paiste, Philadelphia, Pa. A fixture consisting of a hollow structure having an opening for the reception of a conduit, said opening being unthreaded within its outer portion but having at



its inner portion threads for the reception of the threaded end of a conduit, with means for holding a conduit in the unthreaded portion.

919,898. Electric-Fan Support. Evrah C. Lipps, Warren, Ohio, assignor to The Peerless Electric Company, Warren, Ohio. In combination, a support, a fixed yoke, a base plate,



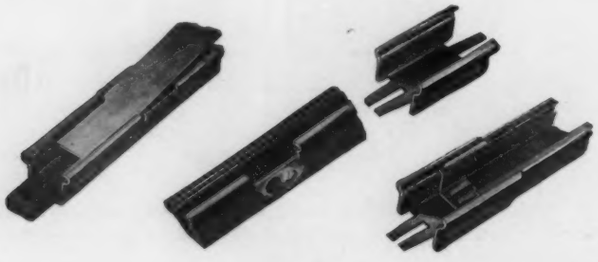
a motor rotatably mounted on said base plate so as to be capable of movement in a horizontal plane, and means connecting the base plate to the yoke so as to be capable of adjusting the motor in a vertical plane.

INDUSTRIAL

"LUTZ" METAL MOULDING

The American Circular Loom Company, Boston, Mass., is again marketing "Lutz" Metal Molding after rebuilding its plant at Kenilworth, N. J., where this product was made, and which was destroyed by fire.

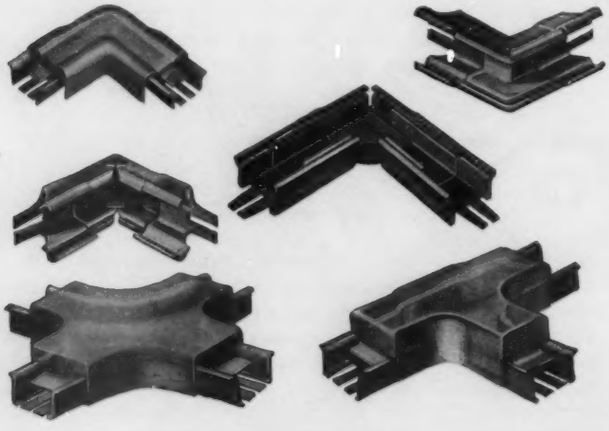
"Lutz" Metal Molding was designed, perfected and patented several years ago. It is approved by the Underwriters, has been used in a number of installations and provides, within a very small space, a complete and continuous raceway for electric wires with fittings for every detail of construction. It is easily installed with the minimum amount of labor.



"Lutz" Metal Molding is furnished in 10-foot lengths and of suitable dimensions to contain two wires or twin conductors which are "laid-in." It is made of Steel, electro-galvanized and consists of a Base in channel form with grooved exterior flanges into which, after the wires are "laid-in," the Flexible Capping slides easily; thus entirely closing the raceway and supporting and protecting the wires. Countersinks are provided at intervals in the Base to receive the necessary screws or nails for fastening it to walls or ceilings.

The exterior flanges can be readily opened at any point for the purpose of sliding in the Capping or removing it to make changes or additions without disturbing the Base or in any way jeopardizing the conductors.

The several lengths of "Lutz" Metal Molding are rigidly and effectually Coupled or Bonded together by "Lutz" Couplings or Bonds with pronged ends which are bent to engage with slots cut in the Base.



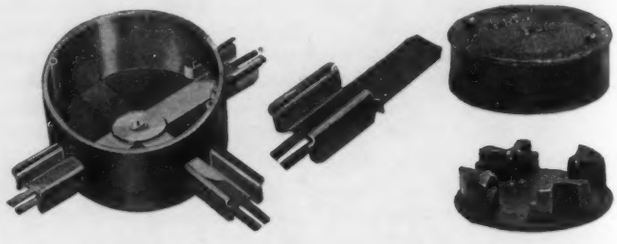
"Lutz" Elbows, both Rigid and Adjustable have pronged ends to engage with slots cut in the Base. These are closed by special covers or by overlapping the ends of the Flexible Capping at the angle of the Elbow.

"Lutz" 3-Way and 4-Way Tees have pronged ends to engage with slots cut in the Base and covers which are held securely in place by lugs over which the Flexible Capping slides.

"Lutz" Adapters are for the purpose of connecting "Lutz" Circuits with Rigid Conduit installations and also with Panel Boards. They have recessed chambers to engage with the Base and lugs to preserve the Capping from contact with wiring connections.

"Lutz" Porcelain Rosettes, Receptacles and Switch Bases straddle and fit the Base. They are furnished with wiring connections and have lugs to preserve the Capping from contact with the connections.

"Lutz" Outlet Boxes are furnished with either special Outlet Bonds or recessed chambers to engage with the Base. Outlet Bushings are not necessary.



"Lutz" Fixture Straps straddle and fit the Base and are held in position by screws and lugs over which the Capping slides.

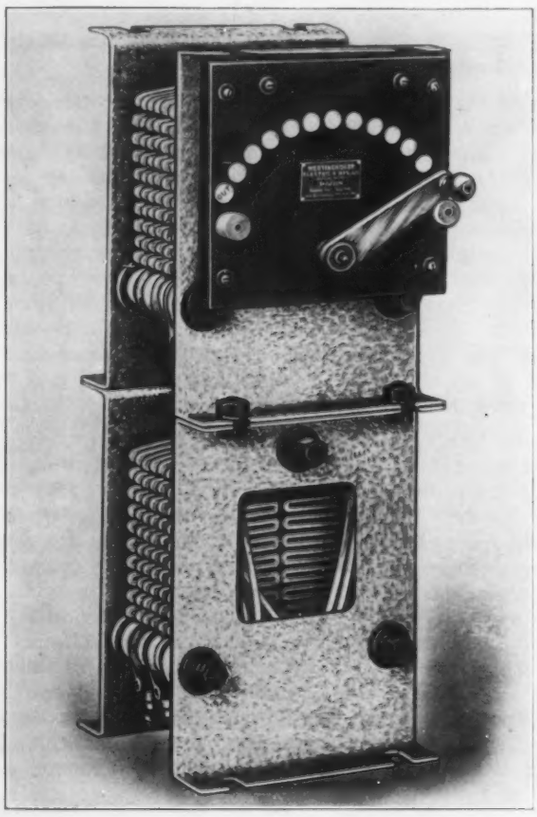
"Lutz" Toggles are for the purpose of fastening the Base to the fireproof walls or ceilings.

"Lutz" Metal Molding is for sale by all Jobbers in Electrical Supplies. Fully illustrated Booklets will be sent upon request by the American Circular Loom Company, Boston, Mass., or any of its branches.

BATTERY CHARGING RHEOSTATS FOR DIRECT CURRENT.

For use wherever a small storage battery is maintained as in public and private garages where only constant voltage direct current is available, a storage battery rheostat is now being sold by the Westinghouse Elec. & Mfg. Co. Some form of resistance must be employed since the voltage at the beginning of the charge is less than is required when the batteries are fully charged, and it is therefore necessary to reduce the voltage, usually by an adjustable series rheostat. The voltage applied to the battery should be raised gradually from the minimum value at the beginning to about 2.7 volts per cell at the end of the process.

The illustration shows a type "DB" battery charging rheostat for 40 to 44 cells which is capable of carrying 50 amperes on any position; other rheostats are supplied for the same current capacity to charge 10 to 14 cells from 110 to 120 volt circuit.



Westinghouse Battery Charging Rheostat.

To select a charging rheostat for a given service, the circuit voltage, the minimum allowable battery voltage and the charging current in amperes must be known. The required rheostat resistance can then be computed as follows:

$$\text{Resistance of rheostat} = \frac{\text{Circuit Volts—Battery Volts.}}{\text{No. Amperes Charging Current.}}$$

The battery voltage is the product of the number of cells in series and the volts per cell. For example, to charge a battery which has 36 cells connected in series, at a maximum rate of 7½ amperes from a 110 volt circuit, the minimum voltage or the initial charging voltage being 2 volts per cell the resistance in the rheostat would have to be as great as

$$\frac{110 - 36 \times 2}{7.5} = 5.07 \text{ ohms approximately}$$

and the standard rheostat with 5½ ohms resistance would be required.

Although these rheostats are rated as for 110 to 120 volts it is possible to use them on higher voltages provided the resistance is great enough to keep the current within the maximum allowable amperage for the batteries, but of course the current capacity of the rheostat must not be exceeded.

These rheostats have a standard finish of black marine for the face plate, the resistance grids are coated with aluminum paint, and the supporting frames are galvanized making rusting impossible. The general appearance of the complete rheostat is such that it can be mounted near any switchboard without forming a displeasing contrast.

The resistance is of the grid type and is rigid, compact and substantial, insuring a long life if not abused. There are thirteen steps by which the resistance can be adjusted, giving ample opportunity for maintaining the current at the correct value. The entire construction is particularly suited for operation by persons unfamiliar with electrical appliances.

NEWS FROM THE ISTHMUS OF PANAMA.

Electrician Killed at Cristobal.—In a conflict between the Panama police and the employees of the Canal Zone, on May 11th, C. M. Abbott, an electrician in the power house at Cristobal was killed.

Oil as Fuel at Miraflores Power Plant.—At Miraflores the Mechanical Division is erecting a 225,000 gallon tank for the storage of oil for fuel in the electrical plant that will supply power for the construction of the locks at Pedro Miguel and Miraflores. This tank is four and one-half times the size of the water tank located on Ancon Hill. The riveting work will be done by pneumatic machinery, an air line having been run to the site for this purpose.

Electrical Current for Colon and Cristobal.—The electrical subdivision of the Mechanical Division is working on an electric light pole-line to connect Cristobal and Colon with the large power generating plant in process of erection at Gatun. This will be a permanent plant, and when in operation will permit of the discontinuance of the electrical generating plants now in Colon and Cristobal, as the Gatun plant will furnish, in addition to the current required there, all the current necessary for the use of the Isthmian Canal Commission and the Panama railroad in Colon and Cristobal.

New Power House.—Work on the power house was satisfactorily continued during the month. About 11,250 square feet of basement floor and 2,000 square feet of walls have been given a water-proof coat of tar and Period roofing paper. About 3000 square feet of floor was finished by masons, the boiler room section having been completed. During the month, all forms for the first floor were built and put in place. The erection of the superstructure was commenced, and 70 per cent of the framing completed. Posts for turbine room were set up, and two trusses put in place. The discharge culvert was completed during the month, and all masonry work completed excepting finishing the paving and construction of the water table around the building. All conduit has been placed in the boiler room floor and in one-half of the turbine room floor. Three base condensers have been set.

CORNING, CAL.—The Northern Electric Power Company is making arrangements to increase its supply of electrical energy in Corning and surrounding country from 2,000 to 6,000 horsepower. The increase is made to meet the demand for electricity for pumping purposes throughout the Maywood Colony. The company is rebuilding its old lines and erecting new transmission lines throughout the town.

TRADE NOTES.

The Western Electric Company is now employing in all about 17,000 persons.

The American Electric Heater Company, makers of electric heating appliances, have just moved into new quarters in Detroit, Mich., with improved equipment and much increased space.

The California Incandescent Lamp Company of San Francisco are arranging to move from their present location at 117 New Montgomery street, to 669 Mission street, in the new Roberts Building.

The Standard Eelectrical Works of San Francisco expect within the next week or ten days to occupy their new quarters in the Roberts Building, which is now being completed at 665-671 Mission street.

Advices from Tokio announce the amalgamation of the American General Electric Company, the Shibaura Engineering Works and the Tokio Electric Company. The American General Electric Company is a big shareholder of the Tokio Electric Company, which is now principally manufacturing electric lamps.

March sales this year of the Western Electric Company were at the rate of about $48,000,000 a year. Telephone sales continue to show a steady improvement not only to the Bell companies, but to outside telephone companies. The greatest ratio of increase in the company's sales has been for some time in the sales to the non-lessee companies.

The Dean Electric Company of Elyria, Ohio, has just closed a contract at Atlantic, Iowa, for a Dean common battery multiple switchboard of two sections, providing exchange apparatus for 540 lines and 35 rural connections. This contract includes wire chief and chief operator's desks and complete terminal and power facilities. The apparatus is arranged for Dean Harmonic selective party line operation.

The Western Electric Company of San Francisco, Los Angeles and Seattle, reports that it is now ready to accept orders for Sunbeam Tungsten lamps in 220 volts and it is understood that immediate shipment can be made in this voltage in the 70 watt and 105 watt sizes. This will be welcome information to many of the high voltage plants which heretofore have been unable to use Tugsten Lamps without wiring them in series. A large demand for these lamps is anticipated.

The annual meeting of the National Electric Light Association will be held at Atlantic City, N. J., June 1, 2, 3 and 4. On the first two days there will be two sessions each day; on the last two days there will be parallel sessions devoted to commercial, technical and accounting subjects. The business headquarters, together with the meeting and exhibit halls, will be on Young's "Million Dollar Pier." The secretary's headquarters will be located near the entrance.

The Belden Manufacturing Company, Chicago, Ill., have been appointed special agents for the Hope Webbing Company of Providence, R. I. The company will have complete charge of the sales of electric tapes, webbings and sleeving for the Hope Webbing Company in Illinois, Wisconsin, Iowa, Minnesota, South Dakota, North Dakota and Montana, and will carry a large stock of these goods in their Chicago warehouse, from which immediate deliveries to the Western trade can be made.

The General Electric Company recently shipped three carloads of material to Seattle, Wash., as an exhibit in the Alaska-Yukon-Pacific Exposition. Almost every class of apparatus is included in the display, from heavy mining machinery and electric locomotives to the latest household appliances. The General Electric Company has furnished the equipment for the exposition buildings, which does not include generating machinery as the energy for the exposition is purchased from the local power company.

At the Alaska-Yukon-Pacific Exposition, to be held at Seattle, from June 1 to October 16, there will be special facilities for the exhibition of inventions of all kinds, not necessarily in manufactured shape. The details of this section are in the hands of Mr. Algar M. Wheeler, Manufacturers' Building, Seattle. A moderate fee, not more than $30, will be charged for all inventions, models, patents, occupying a floor space not more than four square feet, and a small fee for drawings, blue prints, and the like.

The California Electric Company, the Los Angeles house of the Western Electric Company, will, beginning June 1st, discontinue the use of its present name and be operated under the name of the Western Electric Company.

This business was incorporated October 1st, 1905, through the purchase by the Western Electric Company of the supply business of the Machinery and Electrical Company of Los Angeles and the trade developed in Southern California, Arizona and Nevada has placed it in the front rank of electric supply houses in that section.

The annual report of the General Electric Company for the fiscal year which ended January 31, 1909, has just been issued. It shows that the total sales billed for the year were $44,540,676. The company reports that at the present time its sales are at a rate of about $8,000,000 per year better than they were two months ago. It is stated that at present the rate of business is about $52,000,000 per annum. The improvement seems to be general in all departments. Small equipment has shown better development than have the orders for street railway apparatus and for large installations. The company is still carrying its enormous cash balance, its annual report showing that on January 31 there was more than $22,233,671 in cash on hand.

The Los Angeles office of Allis-Chalmers Company has been moved from the Citizens' National Bank Building to larger and more convenient quarters at 129 East Fifth street. The constantly increasing demand for the company's products on the Pacific Coast has compelled this change and necessitated an increase in the selling force, particularly in the steam and mining lines. J. F. Perry is district manager of the company at this office, and E. H. Knepper, formerly with Ingersoll-Rand Company, has become identified with Allis-Chalmers Company's Los Angeles office in the capacity of salesman. The increased demand for mining and crushing machinery, steam and electrical apparatus, hydraulic turbines, gas engines and steam turbines, has also necessitated a larger selling force at the San Francisco office of Allis-Chalmers Company at 599 Mission street.

The Stanley Hotel at Estes Park, Colorado, one of the most elaborately equipped hostelries in that part of the country, is to be operated entirely by electricity. F. O. Stanley, the proprietor, is sparing no expense in the equipment of the house, and has acquired his own water power, which, at a distance of four miles, will provide enough electric power to not only supply all of the electricity for use in the hotel, but for his own private residence and other cottages in Estes Park. Street lighting will also be supplied from the same source. Mr. Stanley is determined to make this hotel representative of the latest ideas in applications of electricity, and has ordered from the General Electric Company a complete electric cooking equipment for his kitchen; electric water heaters for supplying hot water for the baths, kitchen and laundry; electrically heated mangles for the laundry, flat irons, etc. When open for regular service this summer the hotel is expected to be up to the minute in all of its electrical appointments. It is designed to accommodate between 200 and 300 guests.

NEWS NOTES

INCORPORATIONS.

SANTA ROSA, CAL.—The Red Hill Telephone Company has been incorporated here by H. Ehlers, R. Mazza and A. Richioli.

SANTA ANA, CAL.—The Monticello Oil Company has been incorporated here with a capital stock of $1,000,000 by J. E. McDonald, H. P. Oates, K. A. Snyder and J. B. Merrill.

SAN FRANCISCO, CAL.—The Hartford Oil Company has been incorporated here with a capital stock of $500,000 by C. A. Hooper, D. McDuffie, L. Titus, R. McDuffie and W. Havens.

SAN FRANCISCO, CAL.—The Palmer Junior Oil Company has been incorporated here with a capital stock of $2,000,000 by A. Raymond, A. M. Moore, L. Oppenheimer, H. H. Hart and Aaron Sapiro.

LOS ANGELES, CAL.—The San Bernardino Valley Gas Company has been incorporated here with a capital stock of $1,500,000 by C. J. Hall, H. B. Duncan, W. E. Alexander, W. S. White and R. Bandidi.

SAN FRANCISCO, CAL.—The Fifty-Seven Oil Company has been incorporated here with a capital stock of $500,000 by W. N. Drown, J. F. Leicester, V. C. Osmont, F. S. Thompson, C. N. Black, T. W. Ransom and J. H. Follis.

CRESCENT CITY, CAL.—The Smith River Electric Company has been incorporated here by Charles M. Lindsay, president; D. C. Bemarest, vice-president; A. V. Massy, Carl Sann, E. C. Swartz, E. C. Hegler and Sampel Harris. The new company proposes utilizing the water of Smith River for generating electric power to supply Humboldt county, Cal., and for portions of Josephine County, Ore.

FINANCIAL.

IMPERIAL, CAL.—Bonds to the amount of $50,000 have been issued by this city for the construction of a municipal water system.

PORTALES, N. M.—An election will be held here this week to decide on the issuance of bonds to the amount of $50,000 for the construction of a municipal water system.

MONROVIA, CAL.—A bond election has been called on June 7th, 1909, to decide upon the issuance of bonds to the amount of $134,000 for improving the water and sewer systems in this city.

SAN BERNARDINO, CAL.—The directors of the Lytle Creek Power Company have decided to issue bonds to the amount of $300,000 for increasing the capacity of the electric system throughout the residence section of the city.

MANILA, P. I.—Bonds to the amount of $4,000,000 have been issued in this city, by the Bureau of Insular Affairs, for the construction of a municipal waterworks. Bids for the sale of $3,000,000 worth of the bonds are being received at the War Department, Washington, D. C.

BAKERSFIELD, CAL.—The directors of the Associated Oil Company have decided to issue bonds to the amount of $25,000,000 for the construction of pipe-lines from Coalinga to San Francisco and from McKittrick to Gaviota, on the Santa Barabara coast. Another tank ship will also be built.

SACRAMENTO, CAL.—The Northern Electric Company has succeeded in floating a bond issue of $10,000,000 in Amsterdam. The money is to be used in the construction of a new line to connect the company's line with the present line of the Vallejo & Northern Electric Company in Napa Valley, thus allowing the company ferry connections.

SAN FRANCISCO, CAL.—The Board of Supervisors voted last week a $2,000,000 bond issue for the construction of the municipal street railway on Geary street. This proposition will be laid before the voters of San Francisco in June. Overhead trolley and the most improved and modern types of cars and tracks with 109 pound Trilby rails were decided on. The length of the entire road will be seven miles. The exact estimate of cost was figured to be $1,994,232.

LOS ANGELES, CAL.—The Home Telephone & Telegraph Co. of Los Angeles has sold to an Eastern Banking firm a large amount of its securities, and will devote the proceeds immediately to the betterment and extension of its service. Much new equipment will be installed. The company will complete its South Pasadena lines within sixty days, or less time, giving that place direct connection with Los Angeles. Its 300 pair cables have already been strung to the city limits and 50,000 feet of additional cable has been received. With the new equipment the company will be able to serve several hundred more subscribers in South Pasadena. In addition to the above, the company is rapidly extending its lines in other directions, in order to take care of the rapid growth of the city. For several months past the subscribers' list of the company has been increasing by an average of over three hundred telephones per month.

ILLUMINATION.

OAKLAND, CAL.—Permission has been granted property owners along Telegraph avenue to 22d street, to erect electroliers.

LOS ANGELES, CAL.—The Covina Gas Company has applied for a gas franchise along county highways in Covina, Glendale and Azusa districts.

YUBA CITY, CAL.—The Marysville Gas Company proposes to enlarge its 6-inch mains to 10-inch before July 1st, between this city and Marysville.

GUANAJUATO, MEX.—The Guanajuato Power & Electric Company proposes to have its electric light extension to Silao completed within six weeks.

COVINA, CAL.—G. S. S. Horney and associates, the recent purchasers of the Covina gas company's plant, are making preparations for a number of important changes.

LOS ANGELES, CAL.—The Board of Public Works in this city has awarded contracts for ornamental lighting posts to the Llewellyn Iron Works at $100 a post.

LOS ANGELES, CAL.—In addition to being the first in the State to vote an immense bond issue, $3,500,000, for making good roads, Los Angeles County will probably take the lead of the country in lighting its principal highways at night, using electricity. The first step toward this innovation was taken when the Board of Supervisors asked the District Attorney for a legal opinion regarding the method of procedure. The subject was subjected to the county authorities by petitions from several of the smaller cities for partial maintenance of the lamps on the boundaries which reach outside territory. Along the main thoroughfare are many unincorporated settlements and a large population, and one of the supervisors expressed himself as favoring illumination for all these people, as well as those on the edges of cities, and the sentiment seems to meet with approval. It will be a costly proposition and carried out gradually if decided upon.

TRANSMISSION.

CHICO, CAL.—The Sierra Electric Power Company has been granted a power franchise in this city.

DOWNIEVILLE, CAL.—Walter Painter and Homer Guild have located 15,000 inches of water from the North Yuba river just below this city, for developing electric power.

FRESNO, CAL.—The San Joaquin Light & Power Company proposes to begin work shortly on improving its power lines to the suburban towns near this city. The present capacity of the company's plant will also be greatly increased.

MODESTO, CAL.—Attorney W. H. Hatton and Superintendent Archie Scott of the La Grange Light & Power Company, have made arrangements to purchase a tract of land near Dry Creek, where necessary buildings will be erected for the company.

ASTEC, N. M.—Mr. Andrews of this city has introduced a bill in the House at Washington, D. C., providing that the Secretary of the Treasury spend $300,000 for the construction of an electric power plant at Deming, to furnish power for an irrigation project.

SAN FRANCISCO, CAL.—The Great Western Power Company recently secured the contract for supplying electric power to the Southern Pacific Company for the operation of the latter company's interurban system. The company will begin this work the latter end of the present year.

FRESNO, CAL.—Manager A. G. Wishon, of the San Joaquin Power Company, announces improvements during the coming summer, which will cost upwards of $1,000,000. The capacity of Plant No. 1, which is now 2500 horse-power, will be enlarged by 10,000 horse-power, making a total capacity of 12,500 horsepower which will be available.

TELEPHONE AND TELEGRAPH.

SAN JOSE, CAL.—The Pacific Telephone & Telegraph Company received plans this week for the erection of a telephone building on Market street which will cost $50,000.

RED BLUFF, CAL.—The Forest Service is building a telephone line from Paskenta to Poison Glade, a distance of 20 miles. The extension to Covelle, will be made next year.

SAN FRANCISCO, CAL.—The Postal Telegraph-Cable Company has let contracts for the erection of a one-story concrete cable station, at East 27th avenue and Fulton street, costing $3640.

SONORA, CAL.—The Pacific Telephone & Telegraph Company is engaged this week in building new toll lines which will cost $45,000. Manager Fred Mitchell of the local office is now in Stockton on business connected with the project.

EUREKA, CAL.—Operator Harvy Braun of the Fort Bragg Wireless Station has been notified by the officials of the United Wireless Company that as soon as the station, now being erected at San Luis Obispo, is completed, work will be started on the station on the Mendocino coast near Fort Bragg.

TRANSPORTATION.

SACRAMENTO, CAL.—The Sacramento Electric, Gas & Railway Company began work this week on the construction of its electric line over rights of way to the State Fair grounds.

CARSON CITY, NEV.—H. H. Springmeyer and A. Jensen, have organized a company in this city for the purpose of building an electric street railway to connect with the terminus of the Carson Valley branch of the V. & T. Railroad.

WATER

SAN BERNARDINO, CAL.—The Muscoy Water Company has let contracts for five artesian wells.

LOS ANGELES, CAL.—The local water company proposes to spend $15,000 in improving its system in this city.

OCEANSIDE, CAL.—The Board of Trustees will install 2-inch water mains on certain streets where the pressure is low.

CHICO, CAL.—Guy T. Lewis has purchased property about four miles from this city where he will erect a pumping plant.

OAKLAND, CAL.—The City Council has appropriated $4000 for the cost of constructing a salt water pumping station in this city.

MODESTO, CAL.—President Horace Crane of the Commercial Bank of Turlock, was the lowest bidder for the $53,000 water and sewer bonds.

PETALUMA, CAL.—The Trustees of this city have approved plans for the installation of an auxiliary fire-fighting high pressure pumping plant.

SAN RAFAEL, CAL.—The Marin Water & Power Company announce that its pipe line to Sausalito, which is now being built, will be completed by August 15th.

PORTERVILLE, CAL.—Bids are being received by the Board of Trustees for furnishing this city with material for the necessary improvements to the municipal waterworks.

PORTERVILLE, CAL.—Plans and specifications for the necessary changes in improving the water system of this city have been adopted and bids for construction will be asked for at once.

SAN FRANCISCO, CAL.—A merger is planned between the Spring Valley Water Company of this city, and the People's Water Company of Oakland, which will combine all the outlying properties of both companies.

SAN FRANCISCO, CAL.—The Board of Supervisors have recommended $10,000 for the installation of a testing plant for the 45,000 tons of cast iron pipe, the deliveries of which will begin soon for the auxiliary fire protecting system.

ANDERSON, CAL.—Manager James F. Bedford of the Anderson Water Company states that 3-inch mains are to be laid on the streets where the demand exceeds the present supply and on streets where no mains now exist mains of sufficient capacity will be laid.

SAN BERNARDINO, CAL.—The controversy between the farmers and the Riverside Water Company, the Riverside Highland Water Company and the West Riverside 350-inch Water Company for continuing to divert water from a certain artesian basin, was decided last week in the Supreme Court in favor of the water companies.

OIL.

WHITTIER, CAL.—The Warner Oil Company is receiving bids this week for the drilling of its well No. 10.

RIVERSIDE, CAL.—Reports from Mecca, on the Colorado desert, state that oil indications have been found which are causing considerable excitement.

VENTURA, CAL.—Wm. O'Hara has sold the O'Hara Oil Wells in Santa Paula Canyon to Messrs. Barnes, Simons & Brown of Oakland. The new owners are prepared to spend $100,000 in drilling.

ELY, NEV.—Explorations are now being made in Cave Valley for oil. Over $250,000 will be spent in Southern White Pine and Lincoln counties to determine whether oil exists there in commercial quantities.